

FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

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Founder and Editor: STANLEY SPOONER

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DIARY OF CURRENT AND FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list—

1930	
Nov. 25	.. Norfolk and Norwich AeC. Annual Ball, Andrews Hall, Norwich.
Nov. 26	.. Association Football: R.A.F. v. Spartan League, Hitchin.
Nov. 28	.. "Importance of the Boundary Layer," Lecture by H. Glauert, before R.Ae.S., Hull.
Nov. 28	.. "Wapiti in India," Lecture, by Gr.-Capt. R. H. Verney, before Westland Aircraft Soc.
Dec. 4	.. "The Four-Foot Wind Tunnel," Lecture by H. Glauert, before R.Ae.S.
Dec. 5	.. No. 3 Squadron R.A.F. Officers' Reunion Dinner, Trocadero.
Dec. 5	.. Ground Engineers' Lecture, by S. J. Norton, before Westland Aircraft Soc.
Dec. 11	.. "Axial Engines," Lecture by M. L. Bramson, before R.Ae.Soc.
Dec. 11	.. "Float and Boat Seaplanes," Lecture, by Mr. Jackson, before Westland Aircraft Soc.
Dec. 11	.. Association Football: R.A.F. v. Fulham, at Fulham.
Dec. 12	.. Hampshire AeC. Dinner and Dance at South Western Hotel, Southampton.
Nov. 28- Dec. 14	.. Paris Aero Show.
Dec. 17	.. "Soaring Bird Flight," Lecture by Sir G. Walker, before London Gliding Club.
Dec. 25-26	.. Association Football: R.A.F. Channel Islands Tour, Jersey.

EDITORIAL COMMENT



"S that Aden?" an Irish soldier on an east-bound transport was once heard to ask. "Deed and it is," replied his comrade; whereupon the first speaker commented: "Bedad and I'm not surprised at Adam and Ave committin' sin to get out of it."

Many travellers to the East would, granted the premiss, agree with the conclusion of the Irish soldier. A Highland composer of bagpipe tunes has confirmed the general impression that the rocks of Aden are barren, and a view from a steamer in the harbour, and even a visit to the tanks of Suleiman, do nothing to bring home to the mind that Aden is part of Arabia Felix, the rich and prosperous country which the ancients contrasted with Arabia Petraea.

The paper which was read before the Royal United Service Institution last week by Squadron Leader the Hon. R. A. Cochrane, A.F.C., gave quite a new impression of the Yemen. His series of slides showed the terraced cultivation round such towns as Dala and Kataba, which recalls the Alpes Maritimes and the Himalayan foothills. How many of the lecturer's audience, we wonder, had ever before heard of Dala and Kataba? Probably not very many, and still fewer would know that the buildings in those towns have immensely thick stone walls, that not a few of the houses are six or seven storeys high, and that the walls round the towns and the forts which guard them could defy anything short of modern artillery. When one had seen those slides one began to understand why the Zeidi Imam coveted the Yemen and resented the British protectorate over its southern districts. The views of the hills and mountains, in which the wealthy townships lie, explained why it was not practicable for the Army to extend active protection to the tribes in our protectorate except at such cost as a post-war Power could not contemplate. The slides, aided by the very lucid descriptions and explanations of the lecturer, made clear the whole position of British impotence, followed by the rise of Zeidi prestige and the fall to zero point of British

prestige. The position was practically stalemate, for the Imam could not take Aden and the military garrison of the town could not drive him out of our protectorate. But in the East a loss of prestige is worse than a loss of territory, especially territory which we had only undertaken to protect and had no intention of administering. So the Imam had clearly had the best of it.

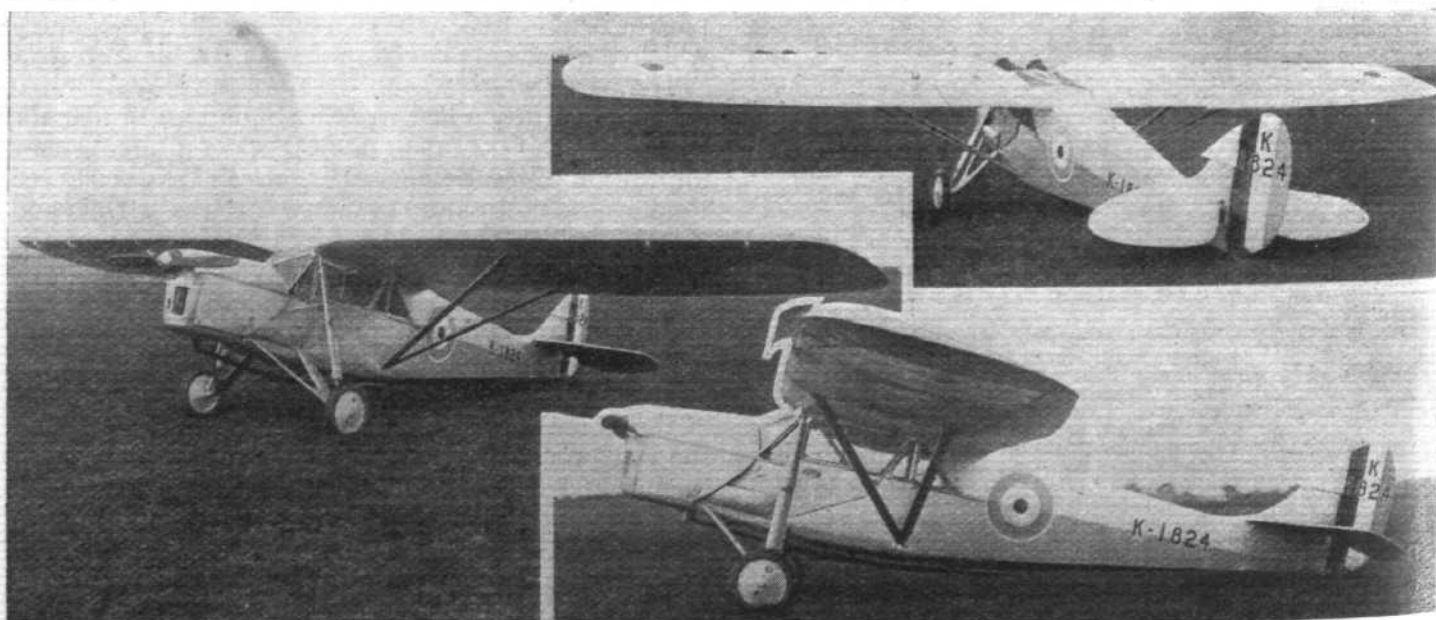
Such was the impasse when the Royal Air Force took charge of the situation. A whole bomber squadron appeared on the scene like a *deus ex machina*, and after about one month of bombing it and to forbid further raids across the border by Zeidi Arabs. The cost of the operations was one officer killed, one Fairey 3F crashed in a sand storm, and about £8,000 worth of bombs. The casualties of the Zeidis must also have been negligible. Our bombs did a minimum of damage to their forts and their dug-outs, and they only submitted because their troops were kept continuously underground and their prestige accordingly evaporated.

These operations were a splendid example of the effectiveness of air action in certain conditions. What lessons of general application can be drawn from this example? It is a matter of importance that those responsible for the defence of the Empire should neither minimise nor exaggerate the powers of the Royal Air Force. The debate which followed Sqdn. Ldr. Cochrane's paper was rather trivial, but it showed that all members of the R.U.S.I. are not capable of clear thinking on such a point. Lord Rawlinson was a clear thinker, and he said that Aden was safe so long as the Navy held the Indian Ocean; otherwise it was not worth worrying about. For protecting and policing the Hinterland the R.A.F. has shown that it suffices, provided that it is not opposed by organised air defences, and provided also that success can be achieved by lowering an enemy's prestige without inflicting much material damage.

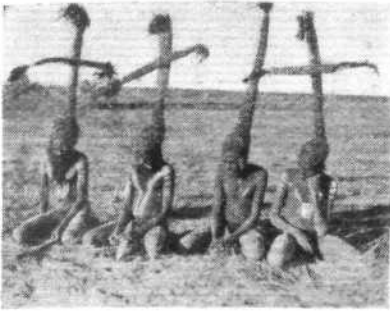
The Zeidis were garrisoning a conquered and more or less unfriendly country, a fact which hampered our aircraft to some extent, but hampered the Zeidi troops still more. Had the tribesmen round Dala not been ready to rise against the Zeidis when they saw that the star of the Imam was on the wane, it is not certain that our success would have been so rapid or so complete. In fact, military action of a sort was needed to reap the results of air action.

One of the claims usually made in favour of air control is that the carnage among those controlled is reduced to a minimum. That is a very telling argument when bombing is directed against those who are really refractory protégées rather than foreign enemies. Sqdn. Ldr. Cochrane gave one such instance: the Subehi tribes in our protectorate. They gave trouble, but were speedily reduced to submission by dropping incendiary bombs on their zaribas and villages after the inhabitants had evacuated them. The same sort of thing has often happened in Iraq, and it is a matter for considerable satisfaction. But the Zeidis were a foreign enemy, and the Imam had a force of well-trained regular troops. As we were able to attain our object without killing many of them, we have every reason to be pleased with the result. But we should like to be able to think that we could have done a great deal more damage if we had wanted to do so.

It is rather disturbing to reflect that our bombs were not very effective against the walls of their forts, and that their troops were practically immune from casualties. The Imam possessed a few aeroplanes, which he was wise enough not to use against us. But this shows that modern methods of war are not now beyond the reach of an Arab potentate. If modern methods of air defence, such as aircraft, wireless and anti-aircraft guns, were ever used against us, we might have to consider afresh the whole question of garrisoning Aden.



A CABIN AEROPLANE FOR THE ROYAL AIR FORCE.—A D.H. "Puss Moth" de luxe high speed communication aeroplane has been purchased by the Air Ministry for trial by the Royal Air Force. We show above three views of this machine. Normal service aircraft of the open cockpit variety necessitate the wearing of special flying clothing, but with the all-enclosed cabin of the Puss Moth extra clothing of any sort is rendered superfluous. Although built in the first instance as a purely civil aeroplane, the Puss Moth will perform aerobatic flying when necessary and has a cruising speed of well over 100 m.p.h. It holds three persons and covers 22 miles on a gallon of petrol. (Flight Photos.)



AERIAL SURVEY OF CENTRAL AUSTRALIA

67,000 Square Miles Mapped

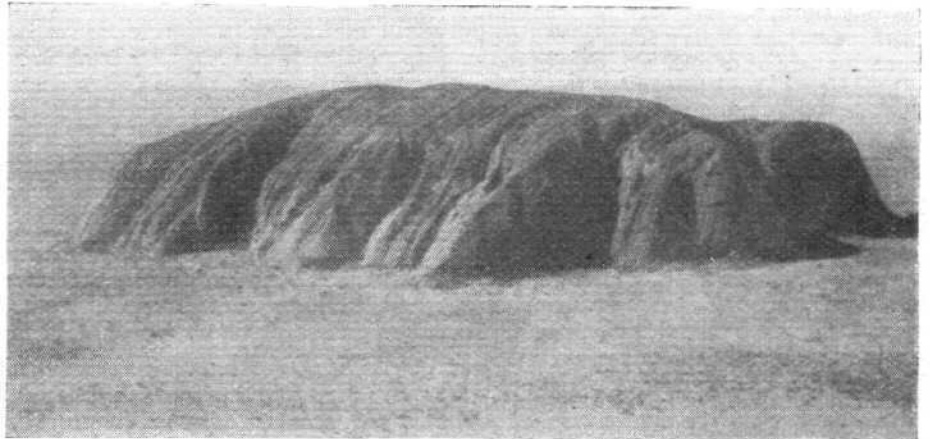


TO take up the flag where the early explorers put it down, and to bear it further into the unknown, is a privilege shared by few." The best-equipped expedition that has ever been organised for exploration in the interior of Australia left Canberra (Federal Territory) for Central Australia on May 25, 1930, in two 485-h.p. Jaguar-engined machines—one of which, the ANEC III biplane *Love Bird* is shown in our illustrations—belonging to the Australian Aerial Services, and set their course direct for Alice Springs.

The leader of the expedition, Mr. Donald Mackay, of Warrendbeen Station, Cootamundra, New South Wales, had planned the flight of 10,000 miles as the culmination of a series of explorations into the unknown regions of the interior, with a picked personnel to assist him.

No time was lost in reaching the survey base, an aboriginal camp called Ilbpilla, in the Ehrenberg Ranges, 250 miles due west of Alice Springs. The arrangement of supplies and of Shell Spirit and oil for

The Pintos and the Eumos at the base camp at Ilbpilla used hardwood for their churingas; they are unable to work stone except by chipping. The fact that they had been pushed farthest west into the Great Victoria and the Great Sandy



Above an aerial view of Ayer's Rock, a remarkable Monolith which rises straight from the main level of the great plain of Central Australia to a height of 960 feet. Below is the ANEC biplane, "Love Bird," of Australian Aerial Services at Ayer's Rock, on the first occasion of landing there. The Rock is two miles away.

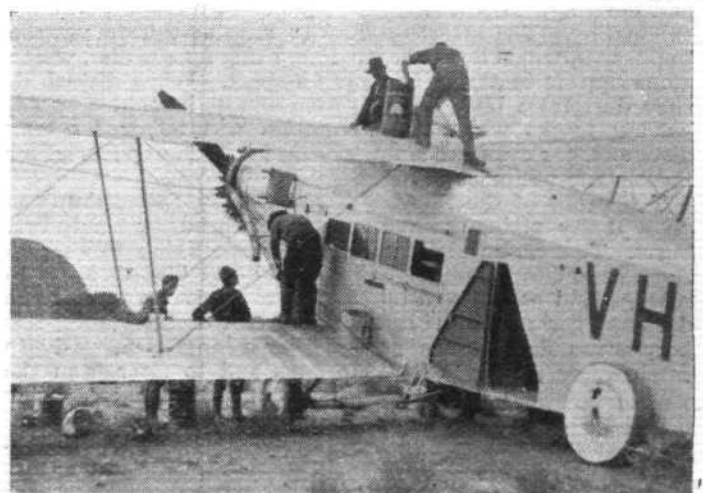


deserts, lends colour to the analogy with ancient Britain, where the more primitive tribes were pushed farther west by each fresh inroad of the more highly-cultured tribes from Northern Europe. As they have lived in such poor country, their development has been retarded until now they are probably the most primitive race in the world. They were amazed when they saw a white man

the machines had been taken in hand some time before, as it took a couple of months to bring a camel team out from Alice Springs to the survey base.

Making Ilbpilla their base, the expedition worked on a 250-mile radius, and their total survey covered an area of approximately 67,000 square miles. A new lake, larger than Lake Amadeus, was discovered 100 miles north-west of Ilbpilla, extending into Western Australia. Like Lake Amadeus, it was salt, and shallow, and dotted with many islands, and landing near it was impossible. Generally speaking, the country was of a forbidding type, with little possibilities of settlement.

All the aborigines around Ilbpilla were extremely primitive, having never seen a white man before the expedition. Scientists in the party ascribed their customs as belonging to the stone age, which was passed in Europe 3,000 years or more ago. The Arunta tribe, of which they saw much at the Hermannsburg Lutheran Mission, is in the transition stage between the paleolithic age, when men used stone implements only roughly chipped, and the neolithic, characterised by the art of grinding and polishing stone to obtain more perfect implements. The Aruntas in the wild state, still use chisels of chipped stone, fastened to a wooden haft with resin from the spinifex, but for their churingas, or ceremonial emblems, they use slabs of stone, ground and polished to a flat oval, and inscribed with designs executed with bones or pointed stones.



Filling up the "Love Bird" with "Shell" at Ayer's Rock before setting out on the last flight over unknown country to Cook. This was the first time an aeroplane had ever landed near the Rock or flown over Noman's Land to Cook.

with a train of camels. Through Hawk Eye, a man of the neighbouring Luritcha tribe, who spoke English and was attached to the camp staff, Bob, the white bushman who prepared the camp, told them of the coming of two great birds, from the bellies of which more men would come. Bob gave them sugar and flour, two luxuries of which they had been ignorant, and when the aeroplanes arrived they were torn between the impulse to run away because of fear, and to remain because of hunger. Many ran away, and some would not be induced to return, although several parties were sent after them. Those who remained hid in the bushes, and only gradually found their way back to the camp. All were naked, except for a belt of a few strands of string twisted from human hair tied around their waists and necks; some of the men wore, by way of decoration, tiny aprons of hair string about two inches in length. Their legs were spindly, and their general physique was poor, but they proved to be capable of fine feats of endurance.

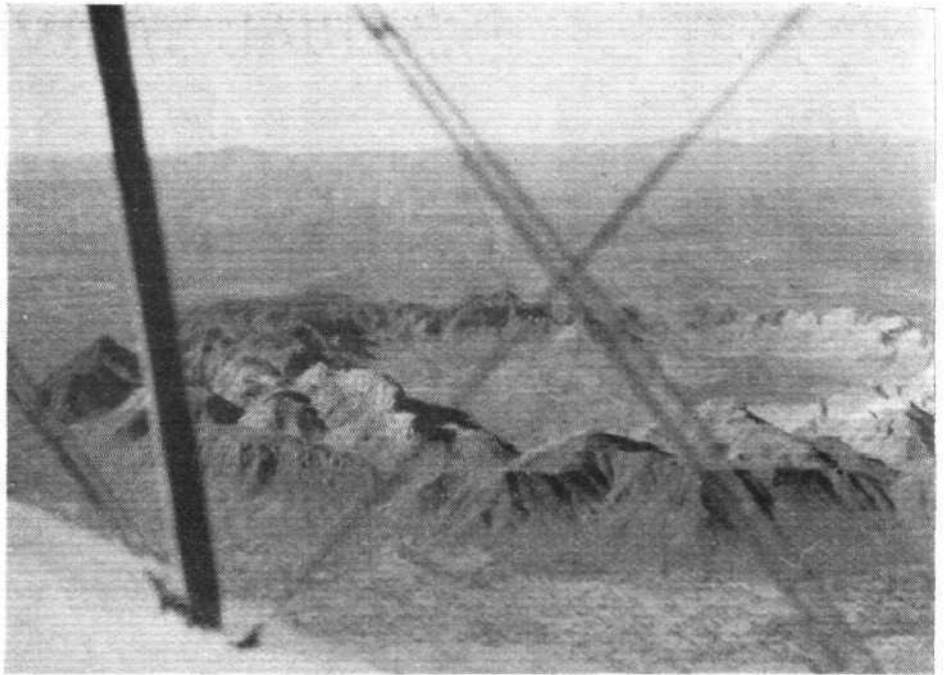
Of necessity both sexes hunt, for game is scarce in all their territory, but the task of collecting vegetable food is left to the women and children. The men set out every day, shortly after sunrise, hunting. Each man carries a couple of spears and a woomera, with which to throw them, and also a burning stick of wood, which he keeps alight all day, for although the aborigines have fire-lighting implements, they do not use them except from absolute necessity. Any small food they catch is usually half roasted, and eaten on the spot; the only mealtime which appears to be at all regular is at night, on the return to camp. Wallabies, or a surplus of kangaroo mice and lizards are carried back to the camp.

Although wallaby forms one of the staple articles of diet, these tribes have no idea of using the skins for coverings, even on the coldest nights, when the temperature falls below freezing point. They sleep in shallow hollows in the sand with not so much as a piece of brushwood over them; their nearest approach to a house is a piece of brushwood, thrown on the ground on the windward side of them to protect them from the fiercest of the blast.

Strife and endurance were exemplified on every hand in the tracts of desert country surrounding Ilbilla. Every form of plant and animal life had won its existence by special adaptation to life in the arid waste, either by aggressiveness, or by the faculty for preserving the last tiny spark of life in readiness for the awakening touch of a wet season. Plants produced innumerable seeds, in the chance that of a myriad, one may find a favourable spot in which to germinate and grow to maturity. Most of the animals are nocturnal, living in caves or burrows away from the dust and sun in the day time, and foraging at night when the temperature is low and least exhausting. The most plentiful of the day-time fauna are the lizards, which lie in the shade, waiting for the flies, which alone appear to thrive in large numbers. When disturbed, they dart from bush to bush with almost incredible speed, leaving tracks which the aborigines will follow for long distances, for even the smallest lizard is a dainty morsel for these poor specimens of humanity.

The camp of the Mackay Aerial Survey Expedition was on a dusty plain, covered with goat's head, or bendy-eye, burrs. To escape walking on them is impossible; to walk on them is to carry dozens of the cruelly spiked seeds away to new ground where a drop of dew is sufficient to stir the dormant germ of life. Like many other desert plants, this burr grows flat on the ground over a large area, ready to catch every drop of dew that falls, and to filter from the vapours arising from the ground at dawn the moisture which it requires. Stunted gums, bloodwoods, whitewoods, and mulga grow in bushes on the plain. Their leaves are hard and as nearly as possible waterless, and their trunks are adapted as water reservoirs, so that parched aborigines cut the trunks of several varieties and drink from them sufficient water to keep themselves alive.

Insect life in the desert was too plentiful for comfort. The variety of ants was remarkable, as were their devices for living under desert conditions. Some we found garnering



Gosse's Bluff Range, situated about 30 miles west from Hermannsburg Mission Station. This remarkable formation is not volcanic, but is the result of weathering and rain action through millions of years, the hard rock portions remaining in the shape of an oval. The Range is two miles east and west, and five miles north and south. Photograph taken from the south-west.

large quantities of grass seeds which grew around their nests. Others with fierce jaws hunt in small droves, preying on other insects and carrion. One interesting type is plentiful on the alluvial flats where the river overflows in flood to a depth of two or three inches. These ants line their nests with an impervious secretion, and build round the mouth a circular rampart of soil held together with mulga leaves to prevent the ingress of the flood waters. The honeypot ant, too, lives in this region. One section of the community lives in a special chamber in the nest and does no work but is fed by the remainder of the inmates of the nest. These are the honey-pots. They secrete honey in their abdomens much as the honey-bee does, and become reservoirs, their bodies swollen to the size of small cherries. When food is scarce, the other ants in the nest come to the honey-pots for food, "milking" from them a drop of nutritious nectar. Trap-door spiders, moths, beetles, crickets, hornets and an occasional dragon fly were also noticed among the insect life.

Smaller animals were plentiful in number but few in variety. The tiny kangaroo mouse, with well developed hind legs and tail for hopping, was frequently unearthed by the aborigines who regarded it as a dainty morsel of food. Of lizards, the most interesting was the barking gecko, a daintily coloured little reptile about 4 in. in length, which normally runs with its body on the ground. When it is angered, however, it widens its mouth fiercely, protrudes its huge eyes, rises slowly on all fours until it stands straight like a horse, and barks savagely with a rasping yap like a terrier.

It may be of interest to note in connection with Ayer's Rock, shown in our illustrations, that it is composed of metamorphic grit and is almost unscaleable. Large pieces of the main rock have fallen away leaving great cavities in the side, there are also very many caves formed by the action of weathering during the millions of years that the rock has been in existence, in these caves are many evidences of aboriginal occupation in the shape of crude drawings. It is $2\frac{1}{2}$ miles east and west and $1\frac{1}{2}$ miles north and south. It rises 960 ft. from the main level of the great plain of Central Australia, the plain itself being 1,650 ft. above mean sea level.

Commenting on the expedition, Mr. Donald Mackay remarked that extremely successful work was carried out from a surveying point of view. Most of the 40,000 square miles that were put on the map had never been previously seen by a white man. Several conjectured forms which appeared on earlier maps proved to be incorrect. The expedition had demonstrated conclusively that the only way to map such country as the interior of Australia was by aerial survey, and he attested to the fine service of the Shell Company in the matter of supplies, which contributed largely to the success of the survey work.



PRIVATE FLYING AND CLUB NEWS



BRITISH FLYING CLUBS

- Aberdeen Aero Club.**—Secretary, 123½, Union Street, Aberdeen.
A.O.C. Flying Club.—Secretary, c/o Aerofilms, Ltd., Colindale Avenue, Hendon, N.W.9.
Bedford Flying Club.—Secretary, 5, Beresford Road, Bedford.
Bedfordshire Aero Club.—Secretary, "Winsthorpe," The Embankment, Bedford.
Belfast Aviation and Gliding Club.—Secretary, "Inglennook," 376, Upper Beersbridge Road, Belfast.
Berks, Bucks and Oxon Aeroplane Club.—Secretary, 12, Highmoor Road, Caversham, Reading.
Blackpool Flying Club.—Secretary, Stanley Park, Blackpool.
Bolton Light Aeroplane and Gliding Club.—Secretary, 7, Butte Street, Bolton.
Bournemouth Aero Club.—Secretary, 16, Howard Road, Bournemouth.
Bristol and Wessex Aeroplane Club, Ltd.—Secretary, Bristol Air Port, Whitchurch, near Bristol.
Britannia Aeroplane Club.—Secretary, Royal Naval College, Dartmouth.
Brooklands Aero Club.—Secretary, Brooklands Aerodrome, Weybridge, Surrey.
Cinque Ports Flying Club.—Secretary, 114, High Street, Hythe, Kent.
Cranwell Flying Club.—Secretary, Cranwell Cadet College, Lincs.
Derby and District Aero Club.—Secretary, "Beechwood," Snelstone, near Cubley, Derbyshire.
Dunlop Aero Club.—Secretary, Fort Dunlop, Erdington, Birmingham.
Essex Flying Club.—Secretary, 30, Hamilton Avenue, Ilford.
Experimental Light 'Plane Club.—Secretary, Lenton Fields, Nottingham.
Felixstowe Light Aeroplane Club.—Secretary, Marine and Experimental Establishment, R.A.F., Felixstowe.
Halton Aero Club.—Secretary, No. 1 School of Technical Training, R.A.F., Halton Camp, Bucks.
Hampshire Aeroplane Club.—Secretary, Hamble Aerodrome, Southampton.
Hanworth Flying Club.—Secretary, Hanworth, Middlesex.
Hastings Aero Club.—Secretary, 46, Havelock Road, Hastings.
- Household Brigade Flying Club.**—Secretary, The Guards Club, London, W.1.
Hull Aeroplane Club.—Secretary, "Evening News," Hull.
Isle of Purbeck Light Aero Club.—Secretary, Swanage Aerodrome, Worth Matravers, Dorset.
Isle of Wight Flying Club.—Secretary, The Aerodrome, Shanklin.
Kent Flying Club.—Secretary, Bekesbourne, near Canterbury.
Lancashire Aero Club.—Secretary, Avro Aerodrome, Woodford, Cheshire.
Leicestershire Aero Club.—Secretary, 3, Granby Street, Leicester.
Liverpool and District Aero Club.—Secretary, Hooton Aerodrome, Hooton, Cheshire.
London Aeroplane Club.—Secretary, 3, Clifford Street, W.1.
Midland Aero Club.—Secretary, 22, Villa Road, Handsworth, Newcastle-on-Tyne.
Newcastle-on-Tyne Aero Club.—Secretary, 41, Coniston Avenue, Newcastle-on-Tyne.
Norfolk and Norwich Aero Club.—Secretary, Mousehold Aerodrome, Norwich.
Northamptonshire Aero Club.—Secretary, 20, Market Square, Northampton.
Nottingham Flying Club.—Secretary, 30, Park Row, Nottingham.
Plymouth Aero Club.—Secretary, 35, Connaught Avenue, Plymouth.
Reading Aero Club.—Secretary, Reading Aerodrome, Woodley, Berks.
Royal Aircraft Establishment Light 'Plane Club.—Secretary, R.A.E., Farnborough, Hants.
Scottish Flying Club.—Secretary, 101, St. Vincent Street, Glasgow.
Sheffield Flying Club.—Secretary, Coal Aston Aerodrome, Sheffield.
South Essex Aero Club.—Secretary, 19, The Pavement, Chadwell Heath.
South Staffordshire Aero Club.—Secretary, Stoke-on-Trent.
Southern Aero Club.—Secretary, Shoreham Aerodrome, Sussex.
Southport Aero Club.—Secretary, Southport.
Suffolk and Eastern Counties Aeroplane Club.—Secretary, The Aerodrome, Hadleigh, Suffolk.
Wiltshire Light Aeroplane and Glider Club.—Secretary, 8, Savernake Street, Swindon.
Windsor Aero Club.—Secretary, Bishop's Farm, Oakley Green, Windsor.
Yorkshire Aeroplane Club.—Secretary, The Aerodrome, Sherburn-in-Elmet, Yorks.

ESSEX Flying Club.—The inaugural meeting of this club was held on November 10, at F. G. Smith's showrooms, High Road, Goodmayes, Mr. F. G. Smith presiding and delivering the opening speech. There were about sixty present, and following the chairman's opening speech, Mr. L. D. Trappitt, Hon. Secretary, outlined the objects of the club. He stated he was loaning his "Avro" machine for the purpose of training pupils, providing at least fifty members



1931 MODELS: Two views showing the latest De Havilland developments: Both the Puss Moth (Top) and the standard Moth will have balloon tyres "Doughnuts" and wheel brakes as standard, while the former will in addition have the oblique windows in front of the pilot made to open, and the latter a particularly comfortable Triplex Wind Screen for the pilot's cockpit. (FLIGHT Photos.)

were forthcoming, also that they had obtained a suitable site for an aerodrome nearby, and had a competent instructor.

The proposed entrance fee was half a guinea for the first fifty members, dating from January 1, 1931, and an annual subscription of two guineas was to be charged to flying members, associate members to be admitted upon payment of one guinea. Instruction rates were fixed at £2 per hour.

The meeting was then thrown open to discussion, considerable interest being displayed by those present, and eventually the club was proposed and seconded, and a committee formed who further discussed matters. It was arranged to call a further meeting on a larger scale in two weeks time, when members would be enrolled.

L EICESTER Aero Club are to co-operate with the Technical College authorities in providing the practical studies for students at the aviation classes. These classes will be held on Wednesday and Friday evenings, and will commence shortly. The decision to hold the classes was reached at a meeting of the Scientific Society, at which Dr. E. Tyler spoke on "Forces Which Lift Aeroplanes."

GROUND Engineering Courses at Brooklands.—It has long been recognised that while there is ample opportunity in this country for learning the art of pilotage, there is much less scope for obtaining a practical acquaintance with the working and maintenance of the aircraft and its engine.

This omission affects not only the would-be ground engineer, but also the private owner who wishes to know something about the possible ailments of his machine—their cause and their cure.

In order to fill this gap, the Brooklands School of Flying have instituted a series of instruction classes in ground engineering, to be held during the winter. There will be two sections: (a) Engine; and (b) Rigging.

The rigging course will include lectures on the theory of flight, the general construction of aircraft, rigging adjustments, the maintenance of aircraft while in service, and all instruments except those directly concerned with the engine. The lectures will be accompanied by practical demonstrations in erecting aircraft and truing up, all these points being simply explained.

The engine course will include lectures on the general principles of the aero engine, its maintenance in service, the finding and correcting of faults, the fit and clearances of various engines, carburation and the carburettor, ignition systems and the magneto simply explained, engine testing, and all instruments concerned with the engine. Practical demonstrations of dismantling and erecting engines will be given, with explanations of fits and clearances and general points to watch while erecting.

In order to make it convenient for everyone to attend, there will be three sessions, a morning session, an afternoon

session, and an evening session, on every day, except Saturdays and Sundays; the same portion of the course being dealt with at each session on the same day. It is estimated that the complete course will last ten to twelve weeks.

For those who require a more superficial course, such as the private owner, there will be a special week-end course. Private owners who wish to arrive by air, can park their machines on the aerodrome.

Apart from its convenience to those wishing to take ground engineer's tickets it is expected that the course will appeal to private owners who will, at least, learn at first hand the result of a landing 10 ft. off the ground, or of too much throttle.

Those interested in the course and requiring further details should write to the Brooklands School of Flying.

The course, incidentally, represents a further broadening of the scope of the school, which it is intended ultimately to make a "University" where everything connected with practical flying will be taught.

BRISTOL AND WESSEX Aeroplane Club.—It has been decided to hold a club dinner at the Grand Hotel, Bristol, on Thursday, November 27, at 7.45 p.m., to which the three previous secretaries of the club have been invited as the guests of the evening. It is hoped that as many members as possible will be present, in order to ensure a successful evening.

The charge for the dinner will be 6s. 6d., excluding wines, and tickets may be obtained from the club office, or from the Grand Hotel, Bristol. It is intended to make this event a "bachelor" party, and lady members will not be present.



GLIDING



BRITISH GLIDING CLUBS

Abergavenny and District Gliding Club.—Secretary, "Trossachs," Park Crescent, Abergavenny.

Aircraft Club, Harrogate.—Secretary, The White House, Starbeck, Harrogate.

Barnoldswick Gliding Club.—Secretary, 49, Church Street, Barnoldswick.

Barnsley Gliding Club.—Secretary, 20, Rowland Road, Barnsley.

Barrow-in-Furness Gliding Club.—Secretary, 31, Church Street, Barrow-in-Furness.

Belfast Gliding and Aviation Club.—R.A.F. Reserve H.Q., Donegall Square North, Belfast.

Bolton Light Aeroplane and Gliding Club.—Secretary, 7, Bute Street, Bolton.

Bradford Gliding Club.—Secretary, S. Young, 17, Roslyn Place, Bradford.

Bridlington Gliding Club.—Secretary, Crescent Court Esplanade, Bridlington.

Bristol Gliding Club.—Secretary, 14, Woodstock Road, Redland Green, Bristol.

Cardiff Gliding Club.—Secretary, 59, Queen Street, Cardiff.

Channel Gliding Club.—Secretary, R. A. F. Station, Hawkinge, Kent.

Cononley and District Gliding Club.—Secretary, The Poplars, Utley, Keighley, Yorks.

Coventry Gliding Club.—Secretary, Llangstone, Job's Lane, Coventry.

Derby and District Aero Club Gliding Section.—"Beachwood," Snelstone, Nr. Cubley, Derbyshire.

Doncaster Gliding Club.—Secretary, 88, Alfred Road, Askern, Nr. Doncaster.

Dorset Gliding Club.—Secretary, 4, Derby Street, Weymouth. Central Information Office, 5, Royal Arcade, Weymouth.

Dover Sailplane Club.—Secretary, 20, Badlis Road, Walthamstow.

Driffield and District Gliding Club.—Secretary, The School House, Gembling, Driffield, Yorks.

Dumfries and District Gliding Club.—Secretary, Thornlea, Rotchell Park, Dumfries.

Dunlop Aero Section.—Manufacturers' Section, The Dunlop Rubber Co., Fort Dunlop, Birmingham.

East Grinstead Gliding Club.—Secretary, Oakdene, Sackville Lane, East Grinstead.

Eastbourne Gliding Club.—Secretary, 81, South Street, Eastbourne.

Edinburgh Gliding Club.—Secretary, 116, Royal Circus, Edinburgh.

Elgin Gliding Club.—Secretary, 71, South Street, Elgin.

Essex Gliding Club.—Secretary, 20, Badlis Road, Walthamstow.

Exeter Gliding Club.—Secretary, 5, Bank Street, Newton Abbot.

Halifax Gliding Club.—Secretary, 94, Lister Lane, Halifax.

Halton Gliding Club.—Secretary, Halton Camp, Bucks.

Herts and Essex Gliding Club.—Secretary, 110, Dunmow Road, Bishop's Stortford.

Ilkley and District Gliding Club.—Secretary, Red Lion Hotel, South Stanley, Nr. Harrogate.

Imperial College of Science Gliding Club.—Secretary, Imperial College of Science and Technology, South Kensington, S.W.7.

Isle of Thanet Gliding Club.—Secretary, 17, Chapel Place, Ramsgate.

Isle of Wight Gliding Club.—Secretary, 61, Swanmore Road, Ryde.

Kent Gliding Club.—Secretary, 14, King Street, Maidstone.

Kilmarnock Gliding Club.—Secretary, 7, Low Glencairn Street, Kilmarnock.

Lancashire Aero Club Gliding Section.—Secretary, Avro Aerodrome, Woodford, Cheshire.

Leeds Gliding Club.—Secretary, 32, Fearnville Grove, Roundhay, Leeds.

Leicestershire Glider Club.—Secretary, Turkey Café, Granby Street, Leicester.

Lincoln Gliding Club.—Secretary, The Manor House, Cherry Willingham, Lincoln.

Littlehampton Gliding Club.—Secretary, 17, New Road, Littlehampton.

London Gliding Club.—Secretary, Empire House, St. Martin's-le Grand, London, E.C.1.

Malton Gliding Club.—Secretary, Welburn, York.

Manchester Gliding Club.—Secretary, "Cyntra," Poplar Road, Didsbury, Manchester.

Matlock Gliding Club.—Secretary, Dean Hill Villas, Matlock.

Merthyr and District Gliding Club.—"Ingleside," The Walk, Merthyr Tydfil, Glam.

Midland Glider Club.—Secretary, 17, Victoria Street, Wolverhampton.

Newcastle Mechanical Club Gliding Section.—Secretary, 27, Philliphaugh, Wallsend-on-Tyne.

North Cotswold Gliding Club.—Secretary, Evesham, Glos.

North Kent Gliding Club.—Secretary, Warren House, Bexley Heath.

North Lindsay Gliding Club.—Secretary, 3, Wells Street, Scunthorpe.

North Staffordshire Gliding Club.—Secretary, 3, Havelock Place, Shelton, Stoke-on-Trent.

Nottingham Glider Club.—Secretary, Welbeck Hotel, Nottingham.

Oxford and County Gliding Club.—Secretary, Brasenose Farm, Cowley, Oxford.

Portsmouth and Southsea Gliding Club.—9, King's Terrace, Southsea.

Preston and District Gliding Club.—Secretary, "Lendor," Lawrence Road, Penwortham Hill, Preston.

Rainford Gliding Club.—Secretary, "Calderbrook," Rainford, Lancs.

Rugby Gliding Club.—Secretary, Cote Hill, Husbands Bosworth, Nr. Rugby.

Sailplane Club of T.M.A.C.—Secretary, 404a, King's Road, Chelsea, S.W.

Scarborough Gliding Club.—Secretary, Harcourt Chambers, St. Nicholas Cliff, Scarborough.

Sheffield Gliding Club.—Secretary, 14, Perigree Road, Woodseats, Sheffield.

South Essex Aero Club Gliding Section.—Secretary, 19, The Pavement, Chadwell Heath.

Southdown Skysailing Club.—Secretary, 14, Brunswick Street East, Brighton.

Stirling and District Gliding Club.—Secretary, Blairlogie Park, Blairlogie, Stirling.

Stockport Gliding Club.—Secretary, Radio House, Sandy Lane, Stockport.

Suffolk and Eastern Counties Aeroplane Club.—Secretary, The Aerodrome, Hadleigh, Suffolk.

Surrey Gliding Club.—Secretary, 24, Woodbridge Hill Gardens, Guildford.

Whitehaven Gliding Club.—Secretary, "Summerfield," 4, Kensington Road, Whitehaven.

Wiltshire Light Aeroplane and Glider Club.—Secretary, 8, Savernake Street, Swindon, Wilts.

Winchester Gliding Club.—Secretary, Fordington Road, Winchester.

Wolsley Glider Club.—Secretary, Wolsley Motors, Ltd., Ward End, Birmingham.

Worthing and District Gliding Club.—Secretary, 24, Ripley Road, West Worthing.

Wrexham and District Gliding Club.—Secretary, Warings Service Garage, Bradley Road, Wrexham.

STOCKPORT Gliding Club.—At a further meeting of the above club held in Crossley's Cafe, on November 11, further plans were discussed *re* the building of the glider. Since the last meeting, the blue prints of the Dickson glider had been secured and an interesting time was spent by the members in looking these over.

The next resolution was to appoint someone at the head of the constructional section who would be capable of taking charge. It was unanimously agreed that Mr. Walton be appointed chairman of the constructional section. Also, in order that a start may be made on the glider as soon as possible, it was resolved that prices of certain raw material which would be wanted be obtained.

It was further resolved to accept Mr. Walton's kind offer of a room in his premises at the Wellington Garage be accepted, and to make this the headquarters for the time being at any rate.

Another resolution put forward was that they should try and get in touch with the Manchester branch of the Royal Aeronautical Society with a view to the interchanging of ideas and suggestions. The secretary was requested to try and make such an arrangement for the members to go over and view their glider. To anyone interested, further details will gladly be supplied upon application to the Secretary, J. T. L. Mallard, The Radio House, Sandy Lane, Stockport. (Tel. 3445.)

THE BRADFORD Gliding Club held a meeting on November 8, when a number of successful flights were made. Members had their first experience of flying in a rather strong wind and the way in which the glider was handled shows that the members have got a very good insight into the control of the machine. The glider was not taken out on Sunday owing to the strong gusty wind.

The club is holding a dance in the Queen's Hall, Bradford, on Thursday, December 4, which will be attended by the Lord Mayor of Bradford, Alderman Alfred Pickles, J.P., and members of all clubs will be cordially welcomed.

Week-end meetings will be held at the club ground at Apperley Bridge every week, weather permitting, and the B.G.C. will be pleased to see anyone who cares to come along, as the gliding is quite interesting to spectators. The Hon. Sec. of the B.G.C. is Mr. S. Young, 17, Roslyn Place, Gt. Horton, Bradford.

COMRIE'S Gliding Club.—At a recent meeting in the War Memorial Institute, Comrie, a gliding club was formed for the district. Capt. Rockey, of Lawers, who is promoting the scheme, explained its object, and was appointed president. Various grounds in the district which might prove suitable for the club's activities were considered, and ultimately ground on Balmuick Farm, Lawers estate, was selected as a temporary gliding ground.

MEMBERS of the Driffield and District Gliding Club held their first dance since the inauguration of the club, at the Rink, November 7, and the large assembly of members and friends included members of the Scarborough Gliding Club and Herr Magersuppe.

The club's Zoglin glider, newly painted in the club's colours after its adventurous career in the flying bouts, was suspended across the room from the balcony.

FROM FALKIRK.—Considerable progress is being made by the newly formed Falkirk and District Aviation Club, which, in view of the imminence of important air developments in the district, will not confine its activities to gliding alone, but will take an active interest in all branches of aviation. About 50 members have already enrolled, and an order is being placed this week for the construction and delivery of the club's first glider. The following office-bearers have been appointed:—Hon. President, the Provost of Falkirk; hon. vice-presidents, the Marquis of Douglas and Clydesdale and Capt. Harvey, Weedingshall, Polmont; president, Maj. R. H. Salvesen, Polmont; hon. secretary, Mr. Andrew L. Tomison, C.A.; hon. treasurer, Mr. David M. Yellowlees; chief instructor, Mr. J. W. Shaw.

KENT Gliding Club.—On November 5, the Kent Gliding Club gave a demonstration of gliding at the R.A.F. station at Eastchurch, by kind permission of the commanding officer, Wing-Comdr. G. W. Murliss-Green, D.S.O., who has recently honoured the club by becoming a vice-president. The demonstration was given at the request of Flight-Lieut. Crawford and Flight-Lieut. Graham Nicholls, with a view to arousing enthusiasm at Eastchurch, and forming an Eastchurch branch of the Kent Gliding Club.

Meteorological conditions were not good for gliding, and the wind direction did not permit taking off from any slope. Accordingly, operations had to be carried out from almost level ground. Mr. Lowe Wylde kindly lent one of his B.A.C. intermediate machines, and the club took their original Zogling. Although soaring was impossible on level ground with the B.A.C. III, it served to show to the uninitiated the difference between a primary and a secondary type of machine. Flight-Lieut. Crawford at first briefly explained to the large gathering of enthusiasts the elements of gliding, and then gave several demonstrations on the two machines. Later, many of the onlookers were given the opportunity to make their first glide. So great was the enthusiasm aroused that there should be no difficulty in forming a strong branch of the club, and with this view a meeting at Eastchurch was arranged.

On Sunday, November 16, training gliding was carried out at Lenham. Unfortunately the wind direction was wrong to give the best results, but nevertheless the club carried on throughout the day, and under the instruction of Flight-Lieut. Graham-Nicholls a large number of flights were made. The hangar, which was recently demolished during a gale, just before completion, is now nearly rebuilt. It will be completed by next week-end, and will enable the machines to be left rigged, thereby saving considerable time, as at present they have to be dismantled and stored in a barn. It is hoped that it will be possible by this saving of time to hold gliding meetings on Wednesday afternoons in the near future. Col. J. T. C. Moore-Brabazon has honoured the club by becoming a Vice-President, and said that he hopes to visit Lenham in the near future and see the club at work. It is interesting to note that Col. Moore-Brabazon is the holder of the first Aeroplane Pilots' certificate to be issued in England, and Mr. Lowe Wylde, one of the club's honorary instructors, holds the first Glider Pilots' certificate.

LONDON Gliding Club.—Owing to the rapidly shortening hours of daylight it has been found necessary to suspend all flying on Saturday afternoons, but to counteract this, arrangements have been made for two training machines and two instructors to be available from 11 a.m. till dusk on Sundays.

Excellent progress was made by the group under instruction on November 9, and this was borne out by the performance on November 16, when no less than five members made the qualifying flights for their "A" certificates. They were Miss Nichol, and Messrs. Grice, Smith Irving, and Hiscox. We particularly congratulate Miss Nichol, who becomes our second lady glider pilot to hold a Royal Aero Club's Glider Pilot's Certificate. From information at present available, it would appear that she is also the second lady glider pilot to qualify for this certificate. This brings the total number of glider pilots' certificates held by members of the club to 38, and we are making a special effort to reach the half century before the end of the year, and at present the prospects of so doing seem distinctly bright. The last week has seen another addition to the fleet of machines owned by members of the club, as a small syndicate of members have brought the almost completely constructed Dickson Glider, which was being built by the "Airship Gliding Club." This brings the total number of privately-owned machines in the club, to four, the other three being Capt. Needham, whose "Albatross" was the first British-built and designed sailplane, Mr. Lander, who owns a Kegel "Prufing," and Mr. Beardmore, who owns a Kegel "Professor."

Will everybody concerned please note that the club London Office has changed its address. In future all communications should be addressed to the Secretary, The London Gliding Club, Empire House, St. Martin's le Grand, London, E.C.1. (Telephone National 8682.)

ISLE OF WIGHT Gliding Club.—Thanks to a good hard-working group of members, under the supervision of Messrs. Richard and Thompson, the glider was ready for a day's meeting, which commenced about 12 o'clock, at Somerton Aerodrome, Cowes, last week-end. The club's Captain made the usual test, followed by Mr. Thompson. Then Mr. Feltham, who made a rather heavy landing broke the rudder bar. This was quickly repaired in the lunch hour and gliding continued very satisfactorily for the remainder of the day. Mr. Stagg made a particularly fine glide and landing. Mr. Gray then followed, and well under control this time. Major Brannon still continues well. Messrs. Richards, Aylwards, Hirst, Hess, Bennett, Allen, Hackshaw, Petty, Mack, and Miss R. Merriam all put in two and three turns each.

The club will meet on Saturday afternoon and on Sunday morning, as usual, at Cowes.

THE IRISH FREE STATE AIR CORPS

DESPITE the fact that Ireland is our very close neighbour, we never seem to hear very much about it aerially, and a large number of people fail to realise that the greater part of the country has now full Dominion Status, and therefore possesses an Army and Air Force of its own. The Army Air Corps, to give it the official title, is nearly nine years old, and was formed immediately after the signing of the Anglo-Irish Treaty, in 1921. The personnel then largely consisted of ex-R.A.F. pilots and it took over the aerodromes and ground organisation which had previously been operated by the British Air Force. Shortly after the formation of the Saorstat, a large political element in the country, dissatisfied with the Constitutional status of the new State, offered armed resistance to the Executive.

It was during this time, 1922-23, that the newly-formed Air Corps had its experience of active service, and proved an invaluable aid to ground troops in the more disturbed areas of the country. On the restoration of law, towards the end of 1923, four out of five aerodromes were evacuated, and are now maintained solely as landing grounds. Headquarters was established at the large aerodrome at Baldonnell, co. Dublin, a few miles outside the city of Dublin itself, and a school for the training of both pilots and mechanics was set up, in addition to large modern workshops. The Free State Authorities may well be congratulated on their decision to establish their Headquarters at such a well-sited aerodrome.

The School of Training, in addition to giving courses of instruction in both flying and technical training, also gives courses to officers of other arms of the Service in Army co-operation, which work is a speciality of the Army Air Corps. Officers of the Air Corps Reserve have also to attend



AT BALDONNELL AERODROME: A Vickers "Vespa" (Armstrong Siddeley "Jaguar"), one of the types used by the Irish Free State Army Air Corps.

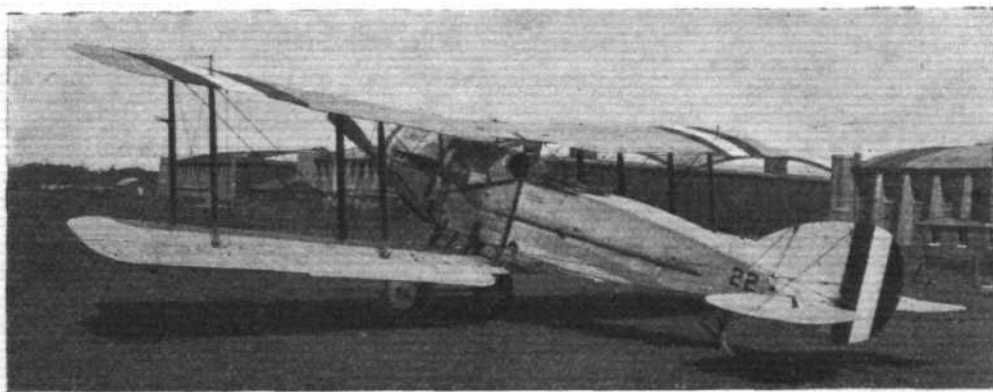
"refresher" courses periodically. Pilot duty is reserved for commissioned ranks only. The history of the Corps shows it to have been remarkably free from serious crashes.

The training of mechanics has hitherto been carried on exclusively at the workshops at Baldonnell, but a new scheme, whereby boys in technical schools are to be taught the rudiments of aeronautical engineering, and afterwards have their training completed by the Corps instructors in a far shorter time than would otherwise be possible, is being prepared.

In spite of the handicap that only one-sixteenth of the Army Vote is devoted to military aviation, remarkable progress has been made under the direction of the Minister for Defence and the Commanding Officer of the Corps. Obsolete machines are being gradually replaced by Vickers "Vespas" and Avro 621s, while other machines in use are Bristol Fighters, D.H. 9s, and Avro 504 Ks. The personnel provided for under the present scheme is 24 officers and 200 other ranks, this being a nucleus for a larger Reserve, which is gradually being built up.

The work of the Corps now includes a great deal of important aerial survey work, and this modern method is likely to prove very useful in revising the existing survey, more particularly in areas where extensive building operations have been carried out. Other aerial photographic work has been undertaken on behalf of the Archaeological Research Commission, with excellent results.

From the flying and general organisation observed by our correspondent when at Baldonnell, it is obvious that the Irish Free State has built up a small, but efficient Air Corps, which has little to learn from the majority of its bigger brothers.



AT BALDONNELL AERODROME: The Bristol Fighter is another type employed by the Irish Free State Army Air Corps.



INTERNATIONAL AIRWORTHINESS STANDARD

SOME 10 years ago efforts were made to establish some common international standard of minimum requirements for airworthiness. Certain points were fixed from time to time, but nothing comprehensive was accomplished, and what was done years ago is now partly out of date. The present position is that every country accepts certificates of airworthiness issued by other countries. Two points are involved, first the safety in operation of aircraft engaged in international traffic, and secondly the airworthiness of machines exported for sale to foreign countries. It is obviously very desirable that one common international standard minimum should be laid down, and an effort is now in progress to bring this about.

The body concerned is the Operational and Materials Sub-commission of the International Commission of Air Navigation.

This sub-commission has appointed a Materials Committee which is meeting in London this week. Great Britain is represented by Major Buchanan of the Air Ministry, and the other members are M. l'Inspector General Batier of France, Cav. Giulio Magaldi (Italy), Dr. E. B. Wolff (Holland), Professor Allard (Belgium), and M. Stoces (Czechoslovakia), while M. A. Roper will act as secretary-general. The committee is meeting at Gwydyr House, Whitehall. The British suggestion is that the whole question should be considered *de novo*, as the existing rulings are mostly out of date.

THE ROYAL AERO CLUB OF THE UNITED KINGDOM

OFFICIAL NOTICES TO MEMBERS

REPORT of meeting of the Committee of the Royal Aero Club, held on Wednesday, November 12, 1930, at 5 o'clock.

Present:—The Rt. Hon. Sir Philip A. G. D. Sassoon, P.C., G.B.E., C.M.G., M.P., in the chair; Griffith Brewer; Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S.; Colonel F. Lindsay Lloyd, C.M.G., C.B.E.; Major H. A. Petre, D.S.O., M.C.; Air Commodore C. R. Samson, C.M.G., D.S.O.; Captain C. B. Wilson, M.C.

In attendance, H. E. Perrin, Secretary; B. Stevenson, Assistant Secretary.

Schneider Trophy.—The recommendations of the Schneider Committee regarding the contest in 1931 were unanimously approved.

The International Sporting Commission of the F.A.I. will meet in Paris on Saturday November 29, to examine the refusal by the Royal Aero Club of the entries of the Italian and French clubs for the Schneider Contest, 1931.

The Royal Aero Club's representative on the International Sporting Commission is Lieut.-Col. M. O'Gorman.

Extraordinary Conference of the F.A.I., Paris—December 1, 1930.—A Conference of the F.A.I. will be held in Paris on Monday, December 1, 1930, to elect a President and Vice-Presidents, and the delegates from the Royal Aero Club will be Lieut.-Col. M. O'Gorman, Major C. J. W. Darwin, Captain C. B. Wilson, H. E. Perrin.

Vacancy on the Committee.—Mr. W. Lindsay Everard, M.P., has been elected to the vacancy on the Committee of the Royal Aero Club caused by the death of Air Vice-Marshal Sir Sefton Brancker.

British Empire Exhibition—Buenos Ayres.—The Committee granted permission for the Schneider Trophy to be exhibited in the British Aeronautical Section of the British Empire Trade Exhibition, to be held at Buenos Ayres on March 14 to April 27, 1931.

King's Cup Air Race.—The recommendations of the Racing Committee and the Society of British Aircraft Constructors were referred to the Racing Committee for further consideration.

Signposts of Air Touring.—The Committee considered the question of signposts for Air Touring, and it was decided to ask for suggestions from the General Council of the Associated Light Aeroplane Clubs.

Election of Members.—The following members were elected:—Flying Officer Douglas Henry Walter Arnot; Francis Rodwell Banks; Frederick Horace Beer; The Earl of Cardigan; Maurice Balfour Chater; Fred Cooper; Harold Vivian Crowder; Flying Officer John Francis Xavier McKenna; Ronald Cecil Howe Monk; Ernest Stephen Olney; Wing-Commander Robert Sydney Overton; Cyril John Penny, O.B.E., M.D.; Capt. the Hon. James Henry Barty Rodney; Edwin Colston Shepherd; Innes Harold Stranger.

Aviators' and Gliding Certificates.—Nos. 9551 to 9994 (Aviators'), and Nos. 8 to 37 (Gliding) were granted. These will be published next week.

Offices: THE ROYAL AERO CLUB

3, CLIFFORD STREET, LONDON, W.1.

H. E. PERRIN, Secretary

AIRISMS FROM THE FOUR WINDS

Mrs. Victor Bruce

THE Hon. Mrs. Victor Bruce, who is flying from England to Tokio in a Blackburn "Bluebird," has arrived in Korea, thus nearly completing her flight. On November 12 she continued her journey from Hongkong over difficult country to Amoy. From here she flew, over Bias Bay, to Shanghai on November 14, and is reported to have seen from above the attack by pirates on the Norwegian steamer *Hirundo*. Mrs. Bruce set out from Shanghai for the 600-mile flight over the Yellow Sea to Seoul, Korea, on November 18, and reached her objective safely.

R.A.F. Flight to Siam

THE three R.A.F. machines, under Air Marshal Sir Geoffrey Salmond (Air Officer Commanding R.A.F., India), which flew from Delhi to Bangkok and Singapore, started on the return flight on November 15, arriving at Alorstar the same day. Tavoy was reached next day.

R.A.F. West African Flight

THE flight of No. 47 Bomber Squadron under Sqdn.-Ldr. Howard-Williams, which started back from Bathurst, in Gambia, on November 9, arriving at Bamako the same evening, reached Segou on November 11 and Kano on the 15th.

Paris-Saigon in Five Days

CAPT. GOULETTE and Lieut. Lalouette have achieved their object in flying from Paris to Saigon (French Indo China) in five days. They left Le Bourget in a Farman F.190 (230 h.p. "Titan") on November 7, and reached Saigon on November 13, having accomplished the 7,100 miles in 5 days, 3 hours 50 minutes.

Northern Rhodesia Air Survey

THE photographing of 63,000 square miles of Northern Rhodesia by the Aircraft Operating Co., Ltd., was completed in four months, May to August, and the final batch of maps prepared from the photographs will be finished and delivered next June, less than 13 months from the start of the active operations. The speed with which this work has been completed is largely due to the facilities provided by the Gloster Survey aeroplane with two "Jupiter" engines, which is practically immune from forced landings, as it can fly

at 9,000 ft. on one engine. This machine, the first ever designed especially for survey work, was flown out to Rhodesia early in the year by Mr. A. S. Butler, Chairman of the Aircraft Operating Co., Ltd. The company is also engaged on making plans and maps on a larger scale of six towns in Northern Rhodesia.

Australian Duties on Imported Aircraft

THE Commonwealth Tariff Board commenced an inquiry at Melbourne in September into a request for increased import duty on aircraft and aircraft parts. The request was made by the Larkin Aircraft Supply Co., Ltd., of Melbourne, and the General Aircraft Co., Ltd., of Sydney. Up to November 1, British aircraft and parts were admitted free into the Commonwealth while foreign aircraft imports were subject to a 10 per cent. tariff. The rates due to come into force from November 1, 1930, were 25 per cent. *ad valorem* on British aircraft and a general tariff of 35 per cent. on foreign imported aircraft. The application was for the tariff to be raised to 30 per cent. *ad valorem* on British aircraft and parts and to 50 per cent. on the foreign imports. It was pleaded by Capt. H. J. Larkin, managing director of the Larkin firm, and by Mr. W. S. Shackleton, chief designer to the same firm, that such increased tariffs would foster a native Australian aircraft industry. The application was vigorously opposed by Mr. Hudson Fysh, managing director of Qantas, Ltd., and by representatives of other Queensland interests. Their point of view was that such a duty would increase the cost of flying in Australia, and restrict the importation of new types. Australia, it was urged, was not yet able to build aircraft with the same facility with which they could be produced in Europe and America.

R 101 Documents

LORD AUCKLAND will, on Thursday, ask the Government for an assurance that all papers and correspondence which passed between Government departments and the Air Ministry and office files (whether secret or not), dealing with the construction and policy of the airship R 101 shall be produced for the Court of Inquiry and especially all correspondence which passed between the Treasury and the Air Ministry.

WORK OF THE AIR FORCE IN ADEN

A VERY interesting lecture was delivered at the Royal United Service Institution, Whitehall, on Wednesday, November 12, by Squadron Leader the Hon. R. A. Cochrane, A.F.C., *p.s.a.*, on "The Work of the Air Force in Aden." The lecturer started by tracing the history of Aden. In January, 1839, Capt. Hayes, R.N., planted the Union Jack there, and so established British authority over the only large harbour on the long coast line of Arabia. The tribes of the Hinterland objected, and though Aden stands on a peninsula which is only connected with the mainland by a narrow spit of sand, they gave so much trouble that treaties had to be entered into with tribes up to a 20-mile radius from the town. The garrison then consisted of some 1,200 British and 1,300 Indian troops. Before long the form of the treaties became protective, the British Government undertaking to protect the tribes and to pay them an annual stipend on the condition that they entered into negotiations with no foreign Power, and in some cases protected the trade routes. No attempt was made to administer the protected territory.

In 1873 some Turkish troops advanced from Sanaa and reached Lahej well inside the protectorate. Diplomatic action was taken at Constantinople, and the troops withdrew, but remained at Dala, which is also within the protected area. After much negotiations a commission established the Anglo-Turkish boundary in 1904. We then established a garrison of 300 men at Dala, but it was a difficult matter to maintain it and its lines of communications, so it was withdrawn in 1907.

During the great war, the Turks advanced in 1915 quite close up to Aden and stayed there until the Armistice. Some of our protected tribes sided with the Turks, while others remained faithful to us.

After the war it became impossible for us to bring diplomatic pressure to bear at Constantinople in order to relieve pressure on Aden. Consequently, we found ourselves in difficulties when in 1920 a religious-political leader, the Imam of the Zeidi Arabs, set up a claim to south-west Arabia. He argued that the Turks had illegally bartered away his ancestral rights. He invaded the protectorate and occupied Dala. Our tribes called to us for help, which we were quite unable to send them. The cost and difficulties of a military expedition through the very high hills of the country made it out of the question. Our position became very undignified, and our prestige sank. For eight years the Imam pressed forward through the protectorate. The Yemen country, known to the ancients as Arabia Felix, is very fertile. The low hills, as was shown in a most interesting series of slides, are extensively terraced, and grow coffee and other crops. Its possession was of great value to the Imam. He had an army of some 6,000 regular troops, drilled and organised by ex-officers and N.C.O.'s of the Turkish army, which made a very efficient fighting force. He had about 30 usable guns, and a force of Arab irregulars amounting to about 10,000, whom he armed. He had also four aeroplanes of sorts, which he used only for communications, and not for military purposes. The Zeidi troops were very thorough in everything which they undertook. The lecturer showed slides of some of the forts which they built in the towns of our protectorate which they occupied. They were extremely solidly built of rough-hewn stone, and would have been impregnable to most military forces which could have made their way across almost roadless country to attack them.

At the beginning of the trouble with the Imam, the Aden garrison consisted of one British infantry battalion, one Indian battalion, the Aden troop of camelry, and one flight of the R.A.F. With this force we were unable to attack the Imam. He advanced so close that the leading citizens of Lahej withdrew within the Aden defences, and the Amir of Dala was a refugee there for some years.

In April, 1928, the defence of Aden was placed under the Air Ministry. A bomber squadron (at present it is No. 8 B.S., equipped with the Fairey 3F) was stationed there, together with a section of R.A.F. armoured cars. The Aden troop was disbanded, and the Indian battalion was sent back to India. The British battalion was retained for a while, until local levies had been raised and trained. These levies consist of five platoons and one camel troop.

Our object now became to drive the Imam and his Zeidi troops out of the protectorate up to and including the town of Dala. The towns in the Yemen are not petty villages; but places of some considerable size, and the houses are often six or seven stories high with immensely thick stone walls.

The Imam naturally disregarded our ultimatum to evacuate

our protectorate. He knew the difficulties of a military expedition, but he did not appreciate the power of the new force which we were now bringing to bear. On June 20, 1928, warnings were dropped in the towns in which we intended to bomb the Zeidi garrisons. They, too, were disregarded. So bombing commenced. The first result was a complete cessation of advance by the Zeidi troops. Their whole energies were devoted to making dug-outs, in which they showed their usual thoroughness. One slide showed how very solid were the dug-outs which they made. The bombs did not, as a matter of fact, do very much material damage to the stone walls of the forts, but they brought all military activities on the part of the Zeidis to an end. In many cases the garrisons soon evacuated the forts and took refuge in neighbouring hills. While there, they were safe from bombs, but the Fairey aircraft did their best with machine guns to make their lives uncomfortable. It is very unlikely that the Zeidis suffered many casualties, but the Imam's whole scheme of things was brought to a halt. The moral effect was much greater than the actual damage. During the operation an American Vice-Consul visited Sanaa, which was far outside the attacked area, and he reported that two-thirds of the population promptly evacuated their houses, when the news of the bombing came through. Our own tribes began to pluck up heart and to attack Zeidi outposts.

Then we sent the Amir of Dala to raise a local force to attack that town. He got together a force of quite unorganized Arabs, whom we helped by supplying rifles to those who had none, sending a W T party with them, and bombing the Dala fort to help their attack. The garrison promptly evacuated the place, escaping by an underground water tunnel, and the Amir re-occupied his town. At the end of three weeks of bombing we had attained our chief objective.

Next month the Zeidi commander of Kataba, another town of importance, began to raid, and one fine morning he marched against Dala with 500 regulars and a pack gun. The first news of the raid received in Dala was the sight of burning villages. A wireless message was sent off to Aden, 70 miles away, and in an hour and a-half the first Fairey had arrived and bombed the pack gun. The Zeidis withdrew to Kataba, where they were heavily bombed. The Imam then forbade further raids on the British side of the boundary line, and the full object of the operations was thereby achieved. There have been no Zeidi raids since 1928.

Our casualties amounted to one officer killed and one aeroplane crashed in a sand storm. The only cost to the Government was the value of the bombs and ammunition, which amounted to something over £8,000. These results were achieved in conditions which were not ideal for aircraft. The weather was not good, the enemy had ample cover, and his garrisons were stationed in towns belonging to our tribes, whom we did not wish to harm. As a matter of fact, after the operations were over, the people of the bombed towns welcomed our officers and showed no trace of resentment. The decisive factor was that we hit at the power of the Imam, and he could not hit back at us.

In January, 1929, trouble broke out in the south-west quarter of our protectorate, the Subehi tribe proving very refractory. They had given trouble every year for about 50 years past. They began to raid, killed a girl near Lahej, and carried off two Government camels from a police post. The usual warnings were dropped and disregarded, so their villages were bombed. These villages and the country round were quite different from those in the previous operations. Flocks and grain were stored in zaribas, which were easily set on fire by small incendiary bombs. The Subehi had promptly driven the flocks into the neighbouring high hills, and there they stayed from January 30 to March 5 watching their villages burning. Then they submitted, paid compensation for the murdered girl, and restored the two Government camels. The success was complete and cheap.

Since then our prestige has been high in the Hinterland. Officers go out with very small escorts and prepare landing grounds near the towns. Political and intelligence officers travel by air to visit tribes which they have not been able to visit for years past, for the journey would sometimes mean travelling 150 miles over very high and rugged mountains. Now such a journey can be made in a very few hours. Thus is personal touch established, and the lecturer said that the essence of air control is a detailed knowledge of the people controlled. Some roads have also been made, and Arabs from Dala, who often go to sea as stokers, can be seen, on return from a voyage, going home from Aden in a hired Ford car.



BRITISH AIRCRAFT INDUSTRY

THIS issue of FLIGHT contains the most complete review of the British Aircraft Industry ever published. It deals with the products of the aircraft firms, aero engine firms, suppliers of materials, and all conceivable accessories. For the benefit of our Foreign readers, the text is published also in French and Spanish, and we believe that this issue of FLIGHT will form a most useful work of reference for anyone interested in any branch of British air activities.

LE présent numéro de FLIGHT contient la revue la plus complète de l'industrie anglaise de l'aviation qui se soit jamais encore publiée. En effet, il y est traité de tous les produits que sont en mesure d'offrir nos constructeurs d'aéroplanes et de moteurs d'aviation, nos fournisseurs de matières premières nécessaires à cette industrie ainsi que nos fabricants d'accessoires les plus variés. Pour la commodité de nos lecteurs de l'étranger les textes sont publiés également en français et en espagnol, et nous avons donc le ferme espoir que ce numéro de FLIGHT constituera un ouvrage de référence, d'une réelle utilité à toutes les personnes qui s'intéressent aux différentes branches de l'industrie aéronautique en Grande Bretagne.

ESTA edición de la revista FLIGHT contiene el estudio más completo de la industria británica de aviación que jamás se haya publicado. En ella se trata de los productos de las casas dedicadas a la construcción de aparatos de aviación, motores para la aviación, abastecedores de materiales y todos los demás accesorios imaginables. Para mayor conveniencia de nuestros lectores en el extranjero, los artículos también han sido publicados en francés y español, y nos domina la impresión de que esta edición de FLIGHT servirá como una obra de referencia de gran utilidad para todos aquellos que estén interesados en cualquiera de los ramos de las actividades británicas de aviación.

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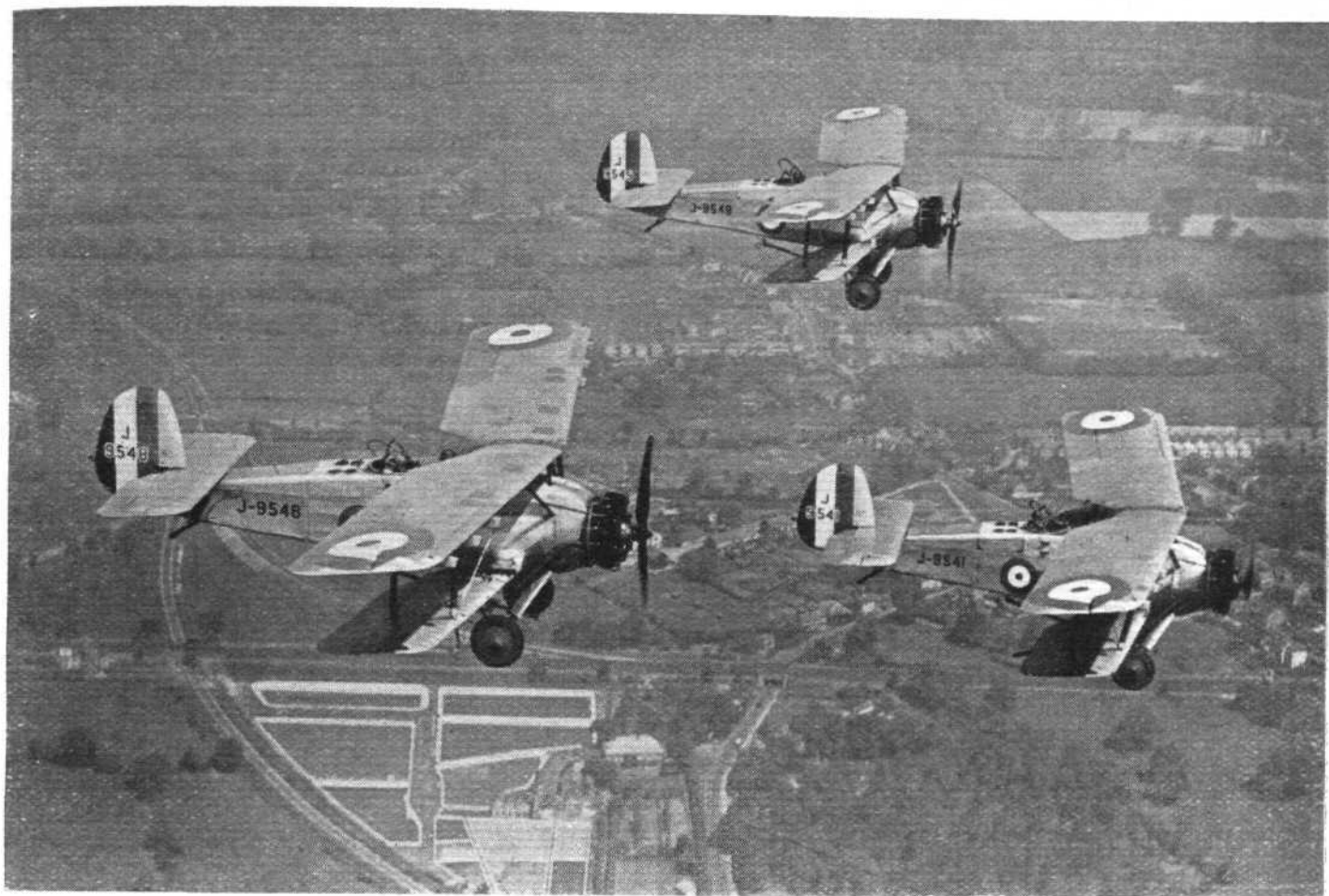
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Trois avions Atlas en vol groupé.

Three Atlases Flying in Formation.

Tres aviones Atlas volando en formación.

ARMSTRONG WHITWORTH

SIR W. G. ARMSTRONG WHITWORTH AIRCRAFT, LTD.,
WHITLEY, COVENTRY

LE groupe de firmes que préside M. J. D. Siddeley représente une très importante section de l'industrie aéronautique anglaise, et quelques mots sur la composition du groupe ne seront peut-être pas sans utilité. La société de capitalisation porte la dénomination de "Armstrong Siddeley Development Co. Ltd.," et c'est à la tête de cette société que se trouve M. J. D. Siddeley. Le groupe comprend trois établissements manufacturiers : Sir W. G. Armstrong Whitworth Aircraft, Ltd., dont les usines sont à Whitley, près de Coventry et se consacrent à la construction d'avions entièrement métalliques. La seconde firme comprise dans le groupe est Armstrong Siddeley Motors, Ltd., dont les bureaux et usines se trouvent à Coventry. Cette compagnie se spécialise dans l'étude et la construction de moteurs d'aviation à refroidissement par air. Et enfin A. V. Roe & Co., Ltd., vint s'ajouter au groupe il y a quelques années. Cette maison étudie et construit des avions, particulièrement des appareils civils. Les usines Avro se trouvent à Manchester. Les produits de la firme Avro sont énumérés sous la rubrique A. V. Roe & Co., et ceux de la société Armstrong Siddeley Motors, Ltd., figurent sous la rubrique appropriée dans la section des moteurs d'aviation.

Déjà peu de temps après la guerre de 1914-1918 M. J. D. Siddeley acquit la conviction que la construction entièrement métallique s'imposerait forcément tôt ou tard, et il chargea ses ingénieurs, notamment le Major F. M. Green et le Major Wyllie, de rechercher

THREE firms are included in the group controlled by the Armstrong-Siddeley Development Co., Ltd. : Sir W. G. Armstrong, Whitworth Aircraft, Ltd., Armstrong-Siddeley Motors, Ltd., and A. V. Roe & Co., Ltd. Although each of the three firms is run as an entirely independent concern, there does exist a division, although not an inflexible one, of the work undertaken. Sir W. G. Armstrong, Whitworth Aircraft, Ltd., whose works are at Whitley Aerodrome, near Coventry, do aircraft work only, and more particularly the design and production of military aircraft. A. V. Roe & Co., Ltd., whose works and designing offices are at Newton Heath, Manchester, do aircraft work (design and construction) only, and of recent years have concentrated chiefly on civil aircraft, of which a number of types have been produced. The division of work, it is to be understood, is not quite as hard and fast as these few notes might indicate, but in a general way the system outlined above is followed. Armstrong-Siddeley Motors, Ltd., in addition to their production of the automobiles bearing their name, design and manufacture aero engines, all of the radial air-cooled type, of which an impressive "family" is now available, as indicated in the section dealing with aero engines. For ease of reference, the work of the three firms of the Armstrong-Siddeley Development Co. group will be dealt with separately each under its appropriate title.

For a number of years the Armstrong-Whitworth firm has specialised on all-metal construction. Already shortly after the end of the war, Mr. J. D. Siddeley, who is the head of the group comprising the three firms mentioned above, foresaw clearly that all-metal construction was certain to be called for, and he set his engineers to work to discover the most suitable forms of metal construction. Among these engineers may be mentioned Major Wyllie, who has patented a great number of metal construction features, and Major F. M. Green, who is Chief Engineer of the Armstrong-Whitworth and Armstrong-Siddeley concerns. After going into the subject thoroughly, it was decided that on the whole steel offered the best solution, and the present forms of Armstrong-Whitworth metal construction are based mainly on steel as the chief material, although the use of light metals where they seem to be preferable has by no means been excluded.

Generally speaking, it may be said that the Armstrong-Whitworth system of metal construction comprises two main divisions : Fuselage construction and wing construction. For the former use is made of steel tubes of round



Avion Armstrong-Whitworth Atlas
recueillant un message.

Armstrong-Whitworth Atlas picking up a message.

Avión Armstrong-Whitworth Atlas
recogiendo un mensaje.

section, usually solid drawn. Joints between steel tube members are made by bolting and not by welding.

In the wing construction use is made of steel strip, rolled or drawn to the desired sections. The main wing spars are made in this way, with webs and flanges of corrugated steel strip sections, joined by riveting. Each spar flange or boom consists of three strips which together form a hollow boom of polygonal section, the strips being of the same width, and the joints placed 120 degrees apart in the polygon. The spar web is a single steel plate, corrugated horizontally. The wing ribs are attached to the spars by a form of toggles which form hinged members in the rib web. The ribs are not located on the spars by riveting or other attachment, but are held in place by the grip of the toggles, which is sufficient to prevent the ribs from sliding along the spars. Some idea of the strength of construction achieved with high-tensile steel strip when it is suitably corrugated may be formed from the fact that a figure of compression stresses as high as 50 tons per sq. in. are resisted by the spars without buckling.

The Armstrong-Whitworth process of heat treatment of the steel strip is interesting, and is, as far as we know, used by no other constructor: The various sections wanted are made by drawing or rolling the steel strip in its untreated state, and the heat treatment is given after forming. This consists in making the steel strip to be heat-treated a resistance in an electrical circuit. At first the current is switched on at a low voltage, and when the strip begins to heat up this voltage is increased until a maximum is reached. The strip is then left in circuit for about half a minute, and is then quenched. Tempering is done in a manner very similar to the hardening process, but the strip is allowed to cool slowly in air.

Mention should be made, before leaving the subject of the Armstrong-Whitworth works at Whitley, of the wind tunnel equipment. This was installed some two years ago, and is under the control of Mr. Reynolds. Among the work carried out may be mentioned some extensive experiments on the Townend Ring, the results of which enabled the Armstrong-Whitworth Company to increase by quite a large margin the speed and climb of their "Siskin" aeroplane.

Of aircraft types produced by the Armstrong-Whitworth company, it will be remembered that the "Siskin" single-seater fighter has been used by the British Royal Air Force in greater numbers than any other type of single-seater fighter, and is still used by the majority of the fighter squadrons. It is an all-metal machine, characterised as regards appearance by having a lower wing very much smaller than the upper.

The Armstrong-Whitworth "Atlas" is another type in extensive use. This is a biplane of typical Armstrong-Whitworth construction, and is normally used as a two-seater Army Co-operation machine, although it has a variety of other uses. For example, it is in use as an advanced training machine, when the military equipment carried by the Army Co-operation type is removed, and the rear cockpit fitted up identical with the front, so that the pupil can fly the machine from either seat, and his controls, instruments, etc. are all identical in form and location. When fitted with a super-charged "Jaguar" the "Atlas" becomes a two-seater fighter with a high

quelles seraient les formes les plus avantageuses. On arriva dès le début des études à la conclusion que l'acier était le métal qui promettait les meilleurs résultats, et tous les avions Armstrong Whitworth actuels se construisent presque entièrement en acier. Les formes de construction choisies n'étaient pas d'une remarquable simplicité, mais ce qu'on recherchait surtout c'était la solidité de la structure, et la question de prix de revient n'était qu'une considération secondaire. Toutefois par l'installation d'un immense outillage les frais de production ont été graduellement réduits, et les appareils Armstrong Whitworth combinent aujourd'hui une grande perfection de structure avec un prix raisonnable. Comme la place dont nous disposons ne permet pas la description détaillée des formes de construction métallique Armstrong Whitworth, nous nous contenterons d'indiquer brièvement que, pour les fuselages, il est fait un usage considérable de tubes en acier sans couture, assemblés par boulonnage et goupillage et non soudés. D'autre part, dans la construction de l'aile intervient beaucoup le feuillard d'acier profilé de diverses façons par laminage et étirage. A l'heure actuelle la maison Armstrong Whitworth produit trois types d'avions militaires: le "Siskin," monoplace de combat, l'"Atlas," biplace de coordination, et le "Starling," monoplace de combat. Ce dernier est assez semblable au "Siskin" mais capable d'une plus haute performance. Les appareils "Siskin" et "Atlas" sont très employés par les forces de défense britanniques.

Pour le moment, la maison Armstrong Whitworth ne construit qu'un seul type d'avion civil; c'est le biplan trimoteur "Argosy" employé par Imperial Airways, Limited, sur les parcours européens de la ligne aérienne Angleterre-Inde. L'"Argosy," qui porte vingt passagers, sera utilisé sur le parcours Le Caire-Khartoum de la ligne aérienne Londres-Cape Town en 1931.

EL grupo de firmas bajo la dirección de Mr. J. D. Siddeley representa una sección muy importante de la industria británica de aviación y, por lo tanto, quizás sería de alguna ayuda y de interés a los lectores si nos detuviésemos un momento para analizar la composición de dicho grupo. El título de la razón social que posee la mayoría de las acciones de toda la organización es Armstrong Siddeley Development Co., Ltd., de cuya compañía Mr. J. D. Siddeley es el principal. El grupo está compuesto de tres empresas manufactureras, a saber, Sir W. G. Armstrong Whitworth Aircraft, Ltd., cuyas fábricas se hallan situadas en Whitley, cerca de Coventry. Esta casa se ocupa de la producción de aparatos de aviación de construcción enteramente metálica. La segunda empresa en este grupo es la sociedad Armstrong Siddeley Motors, Ltd., con sus oficinas y fábricas en Coventry. Esta casa se especializa en el diseño y la construcción de motores de enfriamiento por aire para la aviación. Por último, la sociedad A. V. Roe & Co., Ltd., fué incluida en el grupo algunos años atrás. Esta firma se encarga del diseño y la construcción de aparatos de aviación, más especialmente los del tipo comercial. Las fábricas Avro están situadas en Manchester. Los productos de la empresa Avro han sido descritos bajo el encabezamiento A. V. Roe & Co., mientras que los de la casa Armstrong Siddeley Motors, Ltd., se hallarán bajo el encabezamiento apropiado en la sección que versa sobre los motores de aviación.

Poco tiempo después de terminada la gran guerra de 1914-1918, Mr. J. D. Siddeley ya se había formado la opinión de que tarde o temprano se exigiría la construcción enteramente metálica para los aparatos de aviación y, a este efecto, encargó a sus ingenieros—más especialmente el Mayor F. M. Green y el Mayor Wyllie—que se ocupasen del estudio y el desarrollo de las formas más eficientes. Desde un principio se decidió que el acero era el material que demostraba mayores probabilidades, y todos los aparatos de aviación Armstrong Whitworth de la actualidad están hechos casi en su totalidad de acero. Las formas de construcción que se



Armstrong-Whitworth Starling Single-Seater Fighter.
Monoplace de combat Armstrong-Whitworth Starling.
Monoplaza de combate Armstrong-Whitworth Starling.

performance, and finally it can be used also as a bomber and, by fitting it with duralumin floats, as a seaplane.

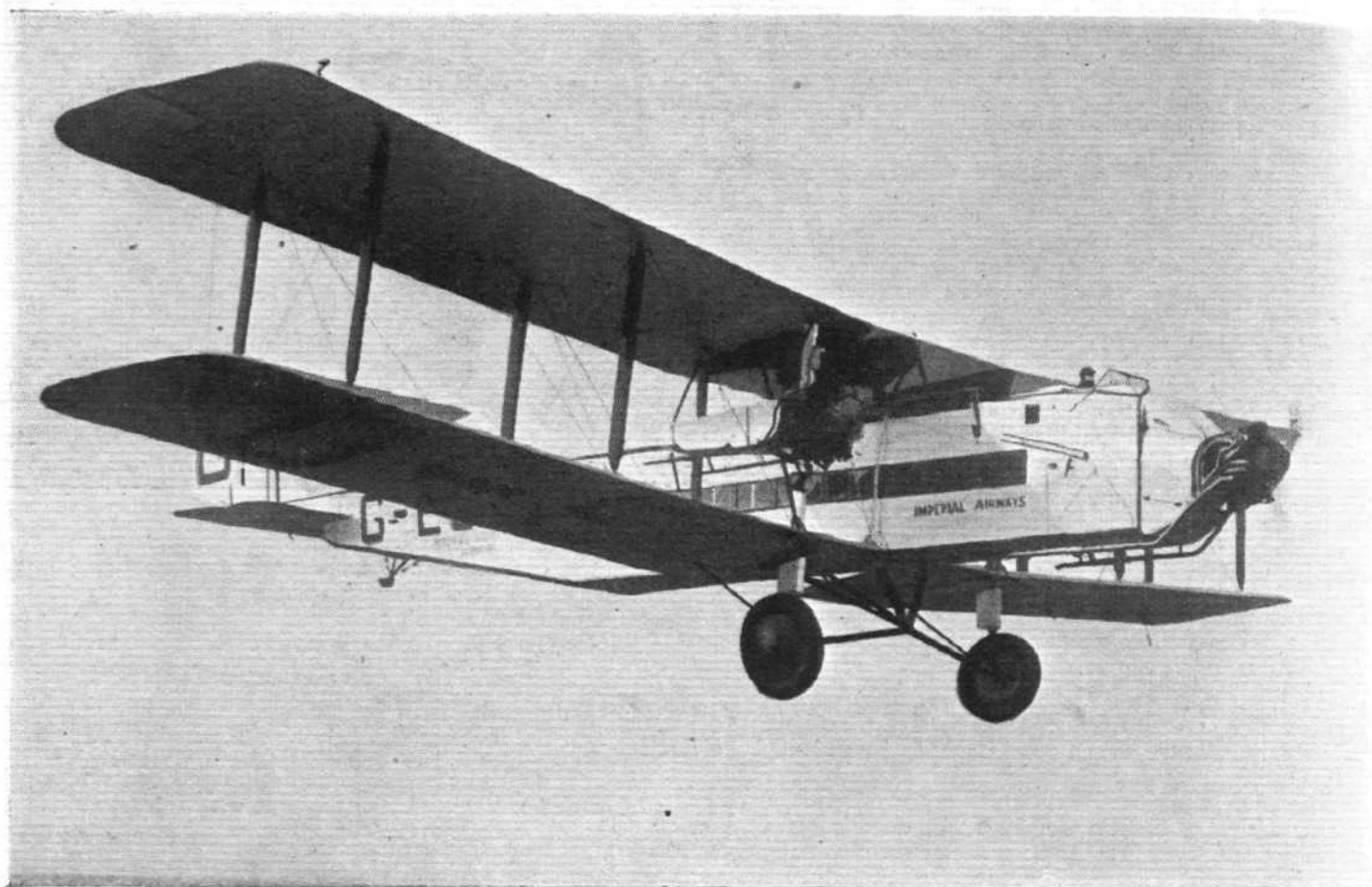
In its Army Co-operation form the "Atlas" carries an armament consisting of two machine guns, in addition to its equipment of camera, wireless and gear for picking up messages from the ground. As a bomber, the machine carries four bombs of 112 lb. each.

The Armstrong-Whitworth "Starling" is a single-seater fighter, in general appearance not unlike the "Siskin," but differing from it in many details. For example, the wing bracing system is quite different, as is also the undercarriage, which is of orthodox Vee type as compared with the frame undercarriage of the "Siskin." Structurally, the "Starling" is of the usual Armstrong-Whitworth construction, with steel tube fuselage and steel strip wing spars and ribs. As the wing section is symmetrical, i.e., with a stationary centre of pressure, the wing bracing system has been simplified, with no wire bracing in the plane of the rear spar. At an altitude of 15,000 ft., the "Starling" has a speed of 178 m.p.h. when loaded to a gross weight of 3,100 lb., and fitted with the supercharged "Jaguar."

Mention has been made of the fact that, since the inclusion of A. V. Roe & Co., Ltd., in the group, that firm has produced most of the civil aircraft types. Previous to that, however, the Armstrong-Whitworth company had produced, for Imperial Airways, Ltd., the "Argosy" biplane with three Armstrong-Siddeley "Jaguar" engines. A number of these machines have been in use by Imperial Airways on the European sections of the England-India route for several years, and have proved themselves thoroughly reliable carriers of passengers, mails and goods. The 1931 programme of Imperial Airways,



Two views in the Armstrong-Whitworth wing assembling shop.
Deux vues de l'atelier d'assemblage d'ailes aux usines Armstrong-Whitworth.
Dos vistas en la nave de montaje de alas—Talleres de Armstrong-Whitworth.



Avion Armstrong-Whitworth Argosy
pour le transport de voyageurs.

Armstrong-Whitworth Argosy passenger carrier.

Avión Armstrong-Whitworth Argosy
para pasajeros.

Ltd., includes the use of the "Argosies" on the Cairo-Khartoum section of the air route from England to Cape Town. The "Argosy" is an all-metal biplane, with steel tube fuselage and steel strip wing spars. The passenger cabin has accommodation for 20 passengers, and, in addition, there are two large compartments for luggage and/or mails. Incidentally, it may be mentioned that the pay load of the "Argosy," when carrying fuel for a $3\frac{1}{2}$ hours' flight, is no less than 5,000 lb.

The petrol tanks of the "Argosy" are mounted in the upper wing, and have a capacity of 360 gallons. Supply to the engines is by direct gravity feed. With full tanks the endurance is in the neighbourhood of $5\frac{1}{2}$ hours. Normally, only sufficient for $3\frac{1}{2}$ hours is carried. The cruising speed of the "Argosy" is 95 m.p.h. With any one of its three engines stopped, the machine maintains its altitude up to a height of 2,000 ft.

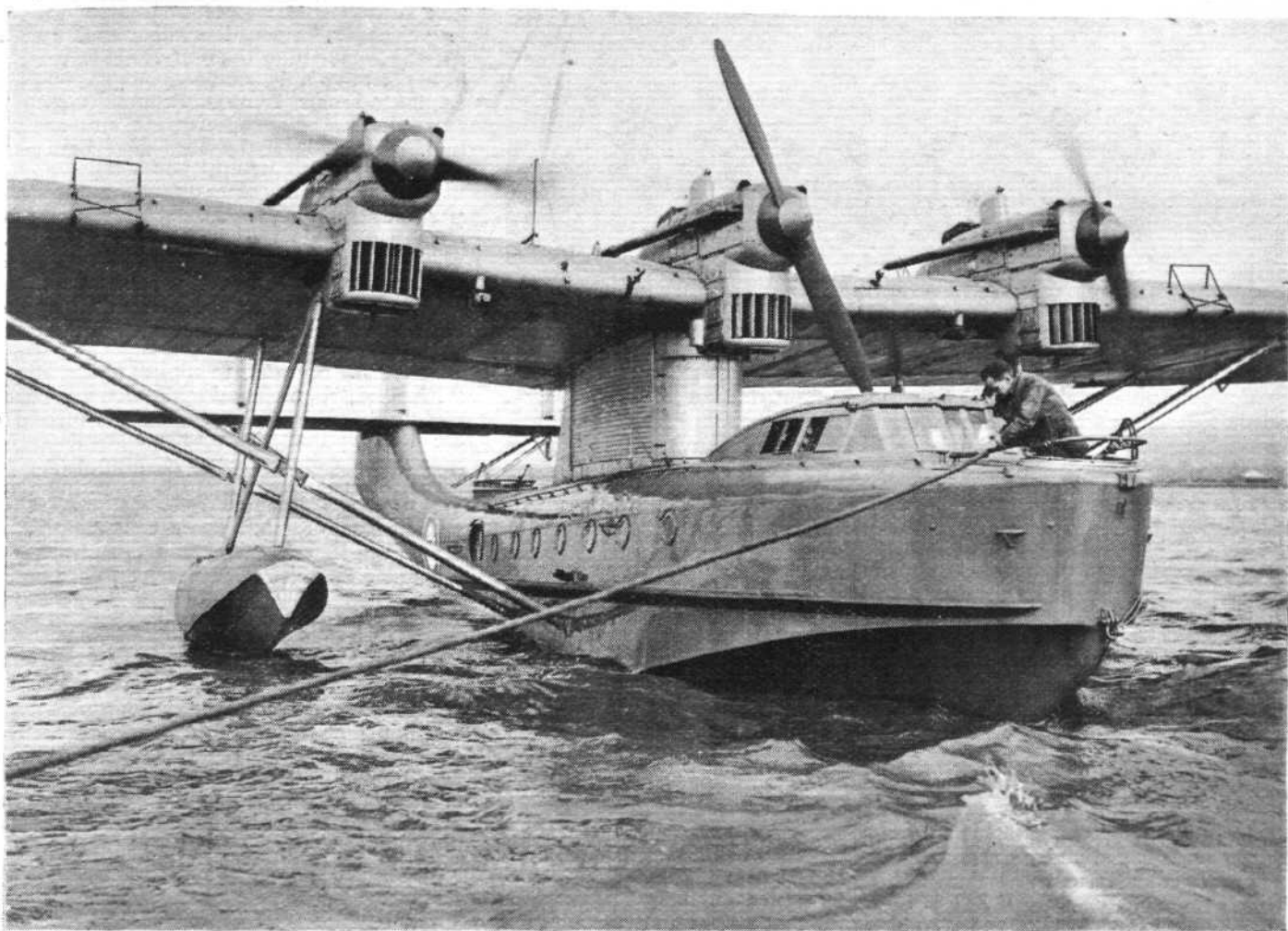
With a tare weight of 12,100 lb., and a permissible gross weight of 19,200 lb., the "Argosy" has a ratio of gross to tare weight of 1.59 or, in other words, it carries as disposable load 59 per cent. of its own weight. The load may be divided up as follows: Fuel and oil 2,100 lb., pay load 5,000 lb. No performance figures are available.

eligieron no presentaban rasgos notables en cuanto a sencillez, pero se intentaba lograr gran eficiencia en la estructura, siendo de menor importancia la cuestión del coste. No obstante, gracias a la instalación de un material extenso se ha podido reducir el coste de producción de manera gradual y, en la actualidad, los productos Armstrong Whitworth reúnen la eficiencia de estructura con un coste razonable.

El espacio disponible en estas páginas no nos permite detenernos para dar una descripción detallada de las diversas formas de construcción metálica adoptadas por la casa Armstrong Whitworth pero, sin embargo, se deberá hacer presente de manera breve que para los fuselajes se emplea extensamente el acero en forma tubular sólida, haciéndose las juntas por medio de pernos y pasadores en lugar de la soldadura. En cambio, para la estructura de las alas se emplea grandemente la tira de acero, formada en secciones diversas por medio de la laminación o el estirado.

En la actualidad, la firma Armstrong Whitworth produce tres tipos de aviones militares, a saber, el modelo "Siskin"—un monoplaza de combate, el modelo "Atlas"—un aparato de dos plazas para fines de cooperación con el ejército, y el modelo "Starling"—otro monoplaza de combate. Este último se asemeja mucho al modelo "Siskin" pero está dotado de una *performance* mucho más elevada. Los aparatos "Siskin" y "Atlas" se emplean extensamente por las fuerzas de defensa en la Gran Bretaña.

Hoy día la firma Armstrong Whitworth solamente se ocupa de la construcción de un solo tipo de aparato de aviación para los fines civiles. Este es el biplano "Argosy" provisto de tres motores, empleado por la empresa Imperial Airways, Limited, en las secciones europeas de la línea aérea de Inglaterra a la India. El avión "Argosy" que es capaz de llevar 20 pasajeros será empleado en la sección El Cairo-Khartoum de la línea aérea de Londres a la ciudad del Cabo en 1931.



Blackburn Sydney flying-boat.
Hydravion monocoque Blackburn Sydney.
Avión marino Blackburn Sydney.

BLACKBURN

THE BLACKBURN AEROPLANE & MOTOR CO., LTD.,

WORKS: BROUGH,
EAST YORKSHIRE

LONDON OFFICE: AMBERLEY HOUSE,
NORFOLK STREET, W.C.2

M. ROBERT BLACKBURN, fondateur de la société Blackburn Aeroplane & Motor Co., Ltd., est un des pionniers de l'aviation britannique. Il pilotait lui-même ses appareils en 1910-1911, et créa en 1914 la compagnie Blackburn, dont le siège fut d'abord à Leeds. En 1929 les ateliers et les bureaux d'études furent transférés à Brough, sur l'Humber. La compagnie Blackburn se spécialise dans la construction d'avions torpilleurs et de grands hydravions monocoques capables de tenir la mer.

En fait d'appareils militaires la firme Blackburn a produit l'"Iris," hydravion entièrement métallique (3 moteurs Rolls-Royce Condor), le "Sydney," hydravion monoplan entièrement métallique (moteurs Rolls-Royce type F), le "Ripon," avion torpilleur avec moteur Napier "Lion," le "Beagle," avion de bombardement opérant

MR. ROBERT BLACKBURN is one of the pioneers of British aviation, having been a pilot and designer of aircraft from the very earliest days of flying, and having founded his company as early as June, 1914. During the beginning of 1929 the Blackburn Co. transferred the greater part of its works, drawing offices, etc., from Leeds, where the firm started its activities, to the Brough seaplane station on the River Humber, where nearly all the work is now carried out.

A number of aircraft types have been produced during recent years, both landplanes and seaplanes. Major Bumpus is in charge of the design of landplanes, while Major Rennie is responsible for the seaplane types.

Service Types

Among the aircraft types produced for use by the British Royal Air Force and the Fleet Air Arm it is only possible here to refer to the following: The Iris and Sydney flying boats, and the Ripon, Beagle, Nautilus and Lincock landplanes.

The Iris III is a reconnaissance flying boat of all-metal construction, fitted with three Rolls-Royce "Condor III" water-cooled engines. The

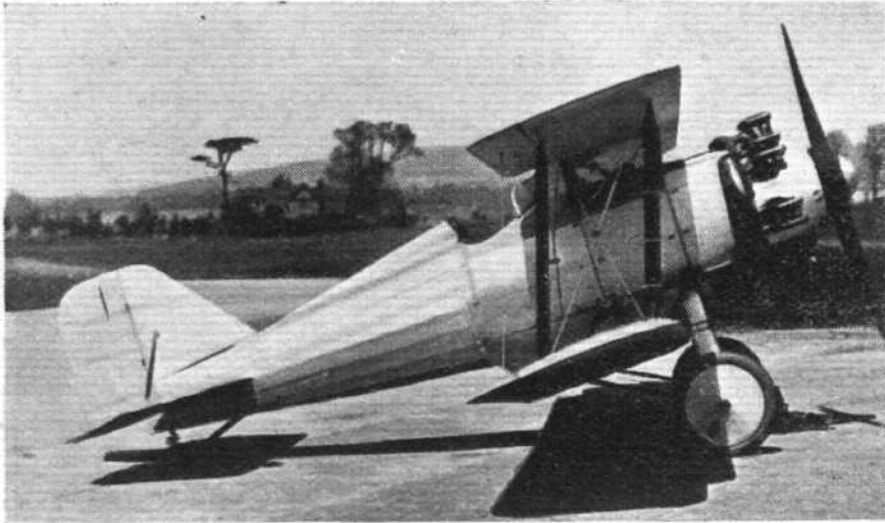
boat hull is built entirely of duralumin with main fittings of stainless steel. It is of the typical British type, with two steps and a pronounced Vee bottom. The wings are built of duralumin spars and ribs, with doped fabric covering. The petrol tanks are carried in the upper wing, giving direct gravity feed to the engines. The armament consists of three machine guns and approximately 1,000 lb. of bombs. Accommodation for a crew of five is provided.

The Sydney is the latest type of flying boat to be produced by the Blackburn firm, and is a new departure in that it is a monoplane flying boat, fitted with three Rolls-Royce "F.XII MS" water-cooled engines. Like the "Iris" it is designed for reconnaissance and coastal patrol, and is of



Model of Blackburn Nile.

Modelo del Blackburn Nile.



Blackburn Lincock single-seater fighter.
Monoplace de combat Blackburn Lincock.
Monoplaza de combate Blackburn Lincock.

all-metal, mainly duralumin, construction. Petrol is carried in the streamline compartment, which runs from the top of the hull to the underside of the wing, and fuel is supplied to the engines by pumps. The hull is of similar shape to that of the "Iris," and lateral stability on the water is obtained by outboard wing floats. Note that the crew is protected by a raised roof with windows which open.

The *Beagle* is a high-altitude day bomber, fitted with Bristol "Jupiter VIII F" air-cooled engine. It is of composite, i.e., partly metal and partly wood, construction. Alternatively the machine can be used as a coast defence, torpedoplane. In that case the military load (represented by the torpedo) is considerably increased, while the performance, especially at altitude, is correspondingly reduced.

The *Nautilus* is a two-seater fleet reconnaissance fighter ship plane, fitted with Rolls-Royce "F.XII MS" water-cooled engine. The machine is of all-metal construction, and is so designed that a float undercarriage can quickly be substituted for the land undercarriage. The structure is also designed for catapult launching. The armament consists of two machine guns, one fixed and operated by the pilot, and the other on a gun ring on the gunner's cockpit.

The *Lincock* is to some extent in a class by itself, in that, although it is a very small machine and fitted with an engine of very moderate power (Armstrong Siddeley "Lynx"), it has an excellent performance and is extremely manoeuvrable. The armament consists of two synchronised machine guns. The latest version of the "Lincock" is of all-metal construction.

The *Ripon* in its latest form is of all-metal construction, and is designed as a torpedoplane or reconnaissance bomber. The engine fitted is a Napier water-cooled, and the machine is equipped with Handley-Page leading edge slots, connected up to, and working in conjunction with, the ailerons. The machine carries, in addition to its armament of machine guns, a full-size torpedo, suspended under the fuselage, between the legs of the undercarriage.

Civil Types

The *Bluebird*.—The first "Bluebird" was built in 1925, and was the first side-by-side two-seater light aeroplane to be put into production. In 1929 the machine was re-designed for all-metal construction and marketed as the "Bluebird IV." The fuselage is partly of steel and partly of duralumin, the steel-tube longerons being joined by gusset plates and tubular rivets. The biplane wings have steel spars of rolled and drawn strip, while the wing ribs are of duralumin, with plate webs and drawn flanges.

The "Bluebird IV" can be supplied with either the "Gipsy" or the "Cirrus" engine. In addition, it is supplied as a seaplane, with two duralumin floats.

The *Nile*.—Owing to pressure of work on service types of aircraft, the "Nile" commercial flying boat, of which the hull was exhibited at Olympia in 1929, has not yet

aux hautes altitudes (moteur Jupiter VIII F), le "Nautilus," avion de combat et de reconnaissance maritime (moteur Rolls-Royce F), et le petit avion de combat monoplace "Lincock" (moteur Lynx). Presque tous ces appareils sont de construction entièrement métallique, et les hydravions Blackburn sont renommés pour leur aptitude à tenir la mer et à opérer près des côtes de Grande-Bretagne par tous les temps. Le "Sydney" est le dernier venu de tous ces types et présente un intérêt plus qu'ordinaire, parce que c'est le premier hydravion monoplan construit par une firme anglaise pour les Forces de défense britanniques.

Il y a deux avions civils portant la marque Blackburn, ce sont le petit biplan léger "Bluebird," et un grand hydravion monoplan multimoteur, le "Nile." Le "Bluebird" est un appareil de tourisme entièrement métallique, caractérisé par la disposition côte à côte de ses deux sièges, qui permet la conversation sans casques téléphoniques. Une grande partie du fuselage est en duralumin, tandis que la cellule biplane est formée de longerons en acier avec nervures en duralumin. Le moteur équipant le "Bluebird" peut être soit un "Gipsy II," soit un "Cirrus III," soit tout autre moteur de 80 à 120 CV.

Le Blackburn "Nile" est, en réalité, le modèle civil de l'hydravion monoplan de reconnaissance "Sydney." Mais il est équipé de trois moteurs Bristol "Jupiter IX" et peut recevoir 14 passagers à son bord. Le premier "Nile" n'est pas encore complètement terminé, mais une photographie de la maquette donne une idée de l'aspect que présentera l'appareil.

MR. ROBERT BLACKBURN, el fundador de la casa Blackburn Aeroplane & Motor Co., Ltd., es uno de los iniciadores de la aviación en la Gran Bretaña. En 1910 y



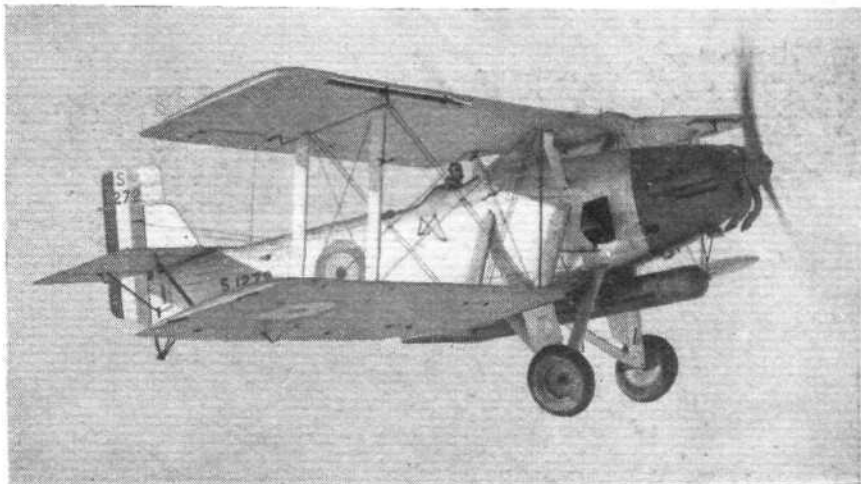
Above: Blackburn Beagle. Below: Blackburn Nautilus.
En haut: Blackburn Beagle. En bas: Blackburn Nautilus.
Arriba: Blackburn Beagle. Abajo: Blackburn Nautilus.

1911 voló con sus propias máquinas, y en 1914 formó la Compañía Blackburn que se estableció en Leeds. En 1929 la fábrica y el departamento de dibujo fueron trasladados a Brough, a orillas del río Humber. La Compañía Blackburn se dedica especialmente a la fabricación de aeroplanos torpederos y a la producción de grandes aviones marinos aptos para navegar.

En lo que se refiere a tipos de aviones militares, la empresa Blackburn ha producido el avión marino "Iris," enteramente de metal (tres motores Rolls-Royce "Condor"); el monoplano marino "Sydney," enteramente de metal (Motor Rolls-Royce tipo "F"); el torpedero "Ripon" con motor Napier "Lion"; el "Beagle," para bombardeo a grandes alturas (motor "Jupiter VIII F"); el "Nautilus," avión de combate para servicio de reconocimiento con la armada (motor Rolls-Royce "F"), y el pequeño avión de combate "Lincock" monopersonal (motor "Lynx"). Casi todas estas máquinas están construidas enteramente de metal, y los aviones marinos Blackburn son famosos por su capacidad para la navegación y por su habilidad para operar alrededor de las costas británicas en cualquier estado de la atmósfera. El "Sydney" es el último tipo que se ha producido, y ofrece interés especial por tratarse del primer avión marino monoplano que ha sido fabricado por una casa inglesa para las fuerzas destinadas a la defensa de la Gran Bretaña.

El nombre Blackburn lo llevan dos máquinas voladoras destinadas a la aviación civil: el pequeño y ligero biplano "Bluebird" y un grande monoplano marino—el "Nile"—con motores múltiples. El "Bluebird" es un aparato de turismo, enteramente de metal, cuya característica consiste en sus dos asientos, dispuestos el uno al lado del otro con el fin de poder conversar sin el uso de teléfonos de cabeza. El fuselaje está en gran parte construido de duraluminio, mientras que las alas del biplano tienen largueros del mismo metal y nervuras de acero. El motor del "Bluebird" puede ser un "Gipsy II", un "Cirrus III" o cualquier otro desde 80 hasta 120 CV.

El "Nile" Blackburn es, en realidad, la versión civil del monoplano marino "Sydney," para servicio de reconocimiento. Dispone, sin embargo, de tres motores Bristol "Jupiter IX" y tiene espacio para transportar 14 pasajeros. El primer "Nile" no está acabado todavía, pero la fotografía de un modelo muestra como será cuando se haya terminado.



Above: Blackburn Ripon. Below: Blackburn Iris III flying-boat.
En haut: Blackburn Ripon. En bas: Hydravion monocoque Blackburn Iris III.
Arriba: Blackburn Ripon. Abajo: Avión marino Blackburn Iris III.

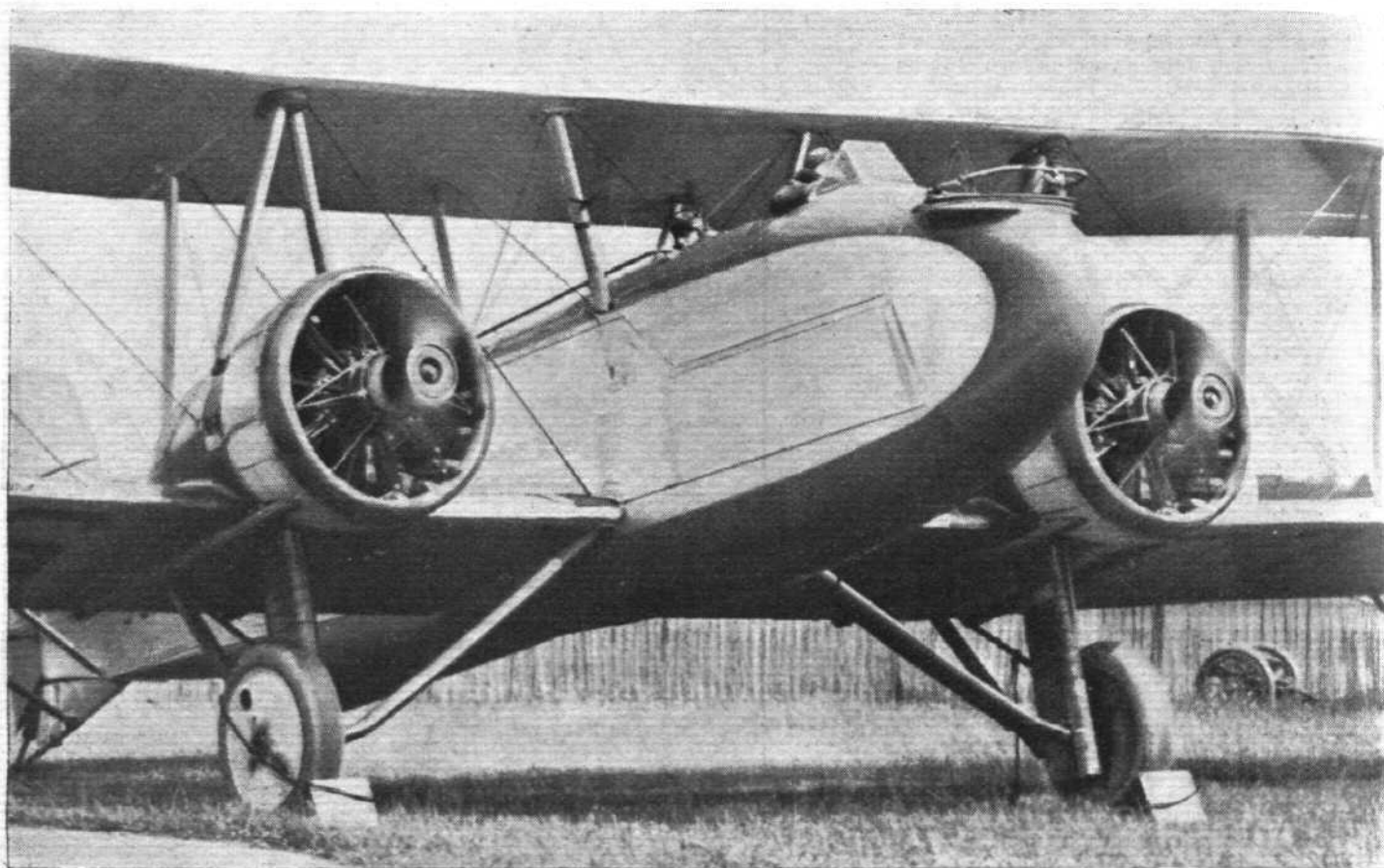
been completed. This machine is the civil version of the Sydney, but has three Bristol "Jupiter" engines in place of the Rolls-Royce engines fitted in the service type. The "Nile" will, when finished, be an all-metal (mainly duralumin) flying boat with accommodation for 14 passengers and a mail compartment which will hold some 1,200 lb. of mails. A luggage compartment will hold about 1,000 lb. of luggage. The "Nile" will have a gross weight of 23,500 lb. (10,645 kg.). It is estimated that the cruising speed will be approximately 104 m.p.h. (162 km./hr.).

The Meteor.—Shortly before his death Sir Henry Segrave designed a twin-engined four-seater machine, the "Meteor," with a view to ascertaining how far a high-performance aeroplane, carrying four people with two engines of medium power, was feasible. The first machine was built by Saunders-Roe, Ltd., at Cowes, and was mainly of wood construction. Subsequent machines, however, will be of all-metal construction, and will be built at the Blackburn works at Brough.

The "Meteor" is a low-wing cantilever monoplane fitted with two "Gipsy III" engines (inverted), and has seating accommodation for pilot and three passengers. It has a maximum speed of about 135 m.p.h. (217 km./hr.), and is claimed to be able to fly with either one of its two engines stopped. The untimely death of Sir Henry Segrave, who was in charge of the technical aviation section of the Aircraft Investment Corporation, has somewhat delayed the production of the "Meteor," which was his particular care, but work will proceed, and the "Meteor" is likely to be heard of soon, not only at home, but also abroad.



Blackburn Bluebird light aeroplane.
Avion léger Blackburn Bluebird.
Aeroplano ligero Blackburn Bluebird.



BOULTON & PAUL

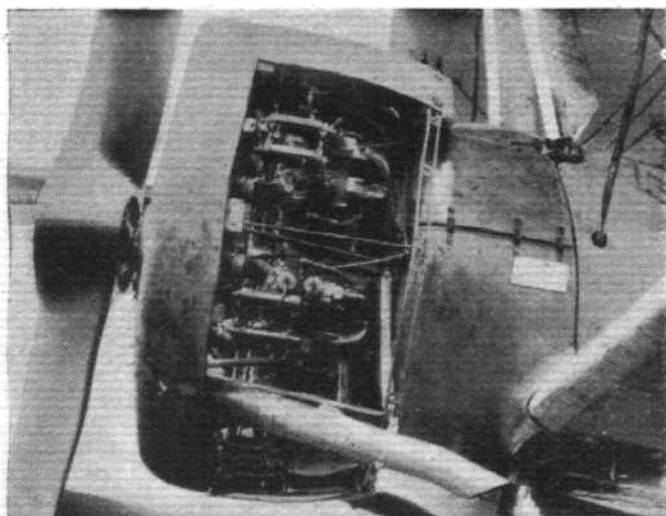
BOULTON & PAUL, LTD.,
NORWICH

Boulton & Paul Sidestrand III (Jupiter XF engines).

Avion Sidestrand III de Boulton & Paul (Moteurs Jupiter XF).

Avión Sidestrand III Boulton & Paul (Motores Jupiter XF).

ONE of the first British aircraft firms to turn its attention to all-metal construction was Boulton and Paul, Ltd., of Norwich. Much experimental work was carried out, not only on different sections of rolled steel strip, but on the best and simplest ways of producing those sections. The result has been that at the present time the firm has standardised a certain number of spar flanges, a certain number of spar webs, and a certain number of fittings for them. From these relatively few standardised sections it is possible to construct a very wide range of wing spars. Thus, when a new machine is being designed, instead of going through the whole process of wing design, and the production of new rollers for the rolling mill, the designers simply pick out the combination of flange and web which gives the desired strength. Any minor differences that remain, such as a spar being just a little over strength or a little under strength, is readily attended to by the



The Boulton and Paul Townend Ring is combined with the exhaust collector. Some of the panels removed to show accessibility.

La couronne Boulton & Paul Townend est combinée avec le collecteur d'échappement. Ici on a enlevé quelques panneaux pour démontrer l'accessibilité du dispositif. La corona "Boulton & Paul Townend" está combinada con el colector de escape. Algunos de los paneles quitados para demostrar la accesibilidad.

LA MAISON BOULTON & PAUL est une des firmes britanniques qui ont abordé la construction aéronautique pendant la guerre, mais elle s'adonnait déjà depuis longtemps à d'autres genres de constructions mécaniques. Au contraire de tant d'autres établissements de la période de guerre, Boulton & Paul sont restés dans l'industrie aéronautique et ont créé un département d'aviation, avec M. J. D. North comme ingénieur en chef. Boulton & Paul se mirent, dès après la guerre, à étudier spécialement la construction métallique et particulièrement la construction en acier, et ils sont arrivés à mettre au point des formes très efficaces de membrure en acier. Ils ont adopté un certain nombre de profils élémentaires en acier laminé, par la combinaison desquels il est possible de créer une infinie variété de formes de structure. C'est Boulton & Paul, soit dit en passant, qui ont étudié et construit la presque totalité de l'ossature du dirigeable R 101, et on se rappellera que l'accident dont il a été victime ne provenait d'aucune défaillance de structure.

Le plus fameux peut-être des avions construits par Boulton & Paul pour l'Aviation Royale de Grande Bretagne est le "Sidestrand," bombardier bimoteur entièrement métallique d'excellente performance. En dépit du fait que les moteurs à refroidissement par air placés sur les ailes tendent à réduire la performance, le "Sidestrand" est un appareil de haut rendement aérodynamique et possède une performance qui correspond à celle d'un appareil monomoteur de même poids par CV et par unité de surface alaire. La maison vient de sortir un modèle perfectionné du "Sidestrand," équipé de moteurs Bristol "Jupiter" XI. Ces moteurs sont munis de couronnes Townend, et il en

résulte une amélioration considérable de la performance par comparaison avec celle du "Sidestrand" III précédent. Boulton & Paul disposent de leur propre tunnel aérodynamique, ce qui les aide puissamment à produire des avions de haut rendement aérodynamique.

LA COMPAGNIE BOULTON & PAUL es una de las empresas británicas que entraron en la industria de la aviación durante la guerra, aunque en otros ramos de la ingeniería es una casa muy antigua. Por el contrario de lo ocurrido con muchas de las compañías del período de la guerra, las casa Boulton & Paul ha permanecido en la industria de la aviación. Tiene establecido un departamento de este ramo y ha nombrado como Ingeniero Jefe a Mr. J. D. North. Poco después de la guerra, Boulton & Paul comenzaron a dedicar atención especial a la construcción metálica, muy especialmente a la construcción de acero, habiendo desarrollado formas muy eficientes de elementos de este metal. Se ha normalizado un número limitado de secciones de acero laminado, mediante las cuales es posible montar una gran variedad de elementos para estructuras. Debe mencionarse que Boulton & Paul diseñaron y construyeron casi toda la armadura de la aeronave R 101, y ha de tenerse en cuenta el hecho de que el accidente no obedeció a defectos de la estructura.

El aeroplano más famoso construido por Boulton & Paul para el Cuerpo de Aviación de la Gran Bretaña es quizá el "Sidestrand," un aparato para bombardeo, enteramente de metal, provisto de dos motores gemelos, cuya performance ha sido excelente. A pesar de que los motores de refrigeración por aire colocados sobre las alas tienden a reducir la performance, el "Sidestrand" es un aparato de suma eficiencia en cuanto se refiere a la aerodinámica, y su performance corresponde a la de una máquina con un solo motor, con el mismo peso por caballo de fuerza y por unidad de superficie alar. Recientemente se ha producido un "Sidestrand" mejorado, el cual está equipado con motores Bristol "Jupiter IX." A estos motores se han fijado coronas "Townend," y el resultado ha sido un aumento considerable en la performance, comparado con el previo "Sidestrand III." Una instalación de tunel aerodinámico, perteneciente a la Compañía Boulton & Paul, ha ayudado a ésta considerablemente en la producción de aviones de gran eficiencia aerodinámica.



Boulton and Paul Sidestrand III (Jupiter VIII engines).
Avion Sidestrand III de Boulton & Paul (Moteurs Jupiter VIII).
Avión Sidestrand III Boulton & Paul (Motores Jupiter VIII).

choice of the gauge of steel used. The same rollers will, of course, produce a given section from steels of different gauges, within limits.

We have taken the wing spars as a typical example. Much the same system, although in a different form, has been used with success in other components of aircraft.

Of aircraft built by Boulton and Paul in recent years and supplied to the British Royal Air Force in quantities, the best known is the "Sidestrand." This is an all-metal high-performance day bomber of remarkably efficient aerodynamic design. The type has undergone modifications since the first machine was built, and the latest "Sidestrand" is the Mark III, with Bristol "Jupiter" X F engines. Details of the performance of this machine may not be given, but the speed at the height at which the machine normally operates is equal to or greater than that of most single-seater fighters. This is due partly to the improved "Jupiter" engines, and partly to the "Townend Rings" fitted over the engines. Boulton and Paul now hold the sole manufacturing rights for this ring.

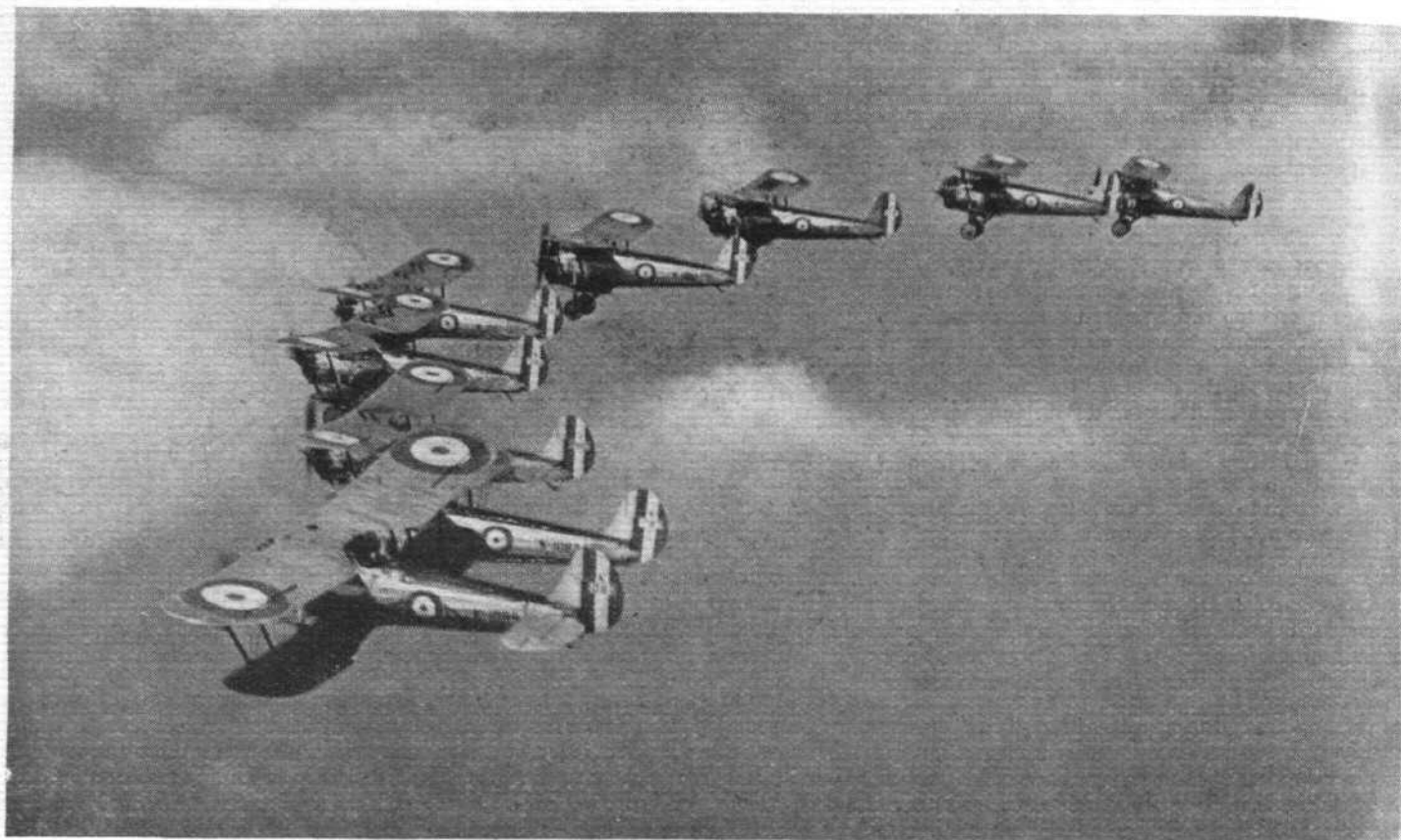
The "Sidestrand III" is a twin-engined day bomber with wings of high aspect ratio, i.e., low span-loading, and a fuselage which is very narrow in proportion to its depth. The small width gives a good view from the cockpits, and the general shape of the fuselage was determined after an exhaustive series of wind tunnel tests. For example, the scoop in the floor for the gunner lying prone increased the drag a good deal, and it took a number of experiments to discover a form of scoop which did not add unduly to the fuselage drag. In the design of the wings also, great care has been taken to achieve good aerodynamic efficiency without unduly increasing the structure weight. Thus, the wings are of greater span than usually found, which results in lower span loading and a reduction in induced drag at low speeds, i.e., while taking off and during climb. Quite elaborate calculations were made to determine what was the maximum increase in span to which it was possible to go before the increase in wing structure weight would outweigh the saving resulting from reduction in induced drag. And so throughout the design of the "Sidestrand" quite remarkable care has been taken in order to produce the most efficient aircraft possible.



Avion léger Phoenix de Boulton & Paul.

Boulton & Paul Phoenix Light Aeroplane.

Aeroplano ligero Phoenix Boulton & Paul.



BRISTOL

THE BRISTOL AEROPLANE CO., LTD.,
FILTON HOUSE, BRISTOL

A formation of Bristol Bulldogs.
Avions Bristol Bulldog en vol groupé.
Aviones Bristol Bulldog volando en formación.

FOUNDED in February, 1910, as the British and Colonial Aeroplane Company, by Sir George White, Bart., and his brother, Mr. Samuel White, the present Bristol Aeroplane Co., Ltd., is one of the oldest of British aircraft firms. In 1910, a beginning was made with biplanes of the Farman "box kite" type, but it was not long before original design was started, and the old Bristol company had associated with it a long series of names that became famous in the earliest days of flying. From those days to the present times, the Bristol firm has never looked back, and theirs has been an existence of steady and uninterrupted development. Space does not permit here of referring to the early history of the Bristol firm, fascinating though it is. After the war, 1914-1918, the firm changed its title to the present one, and at about the same time the "Cosmos" engine firm was taken over, and with it Mr. Roy Fedden, who had designed the "Cosmos" engines and became chief designer and engineer of the Bristol aero engine department.

During the years since the "Cosmos" firm was taken over by Bristols, some remarkable progress has been made, and a series of famous engines have been produced. These are dealt with in another section of this issue, but it may be mentioned here that the Bristol aero engine works are equipped with the very latest machinery, specially designed for the production of radial air-cooled engines, and that the workmanship of Bristol engines is the very finest to be seen anywhere in the world. As an example of the care taken, it may be pointed out that the engines are now machined all over. Not only the crankcase, but the cylinders and cylinder heads are finished in this manner, and the less visible parts of the engines are finished with quite as much care.

Of the aircraft section, Capt. F. S. Barnwell has been chief designer since before the war, and of the many types designed by him none is, perhaps, better known than the famous old "Bristol Fighter." In recent years, the best-known type is the "Bulldog" single-seater fighter, which is now used by squadrons of the British Royal Air Force.

When the British Air Ministry announced, some years ago, that all-metal construction would be insisted upon for all aircraft of service type, the Bristol company laid down an extensive plant for the production of metal components of aircraft, and steel was the material selected by the Bristol engineers. Mr. H. J. Pollard, who had previously been engaged on metal construction at Boulton & Paul's, was put in charge of the metal construction production and, under Capt. Barnwell, has produced some very ingenious forms of steel construction, the details of which will be familiar to FLIGHT readers from a series of articles contributed by Mr. Pollard to our monthly technical supplement THE AIRCRAFT ENGINEER.

In addition to the forms of all-metal construction which have by now become more or less standardised, the Bristol company has carried out a vast amount of experimental work of which the outside world knows nothing.

PARMI les plus anciennes maisons anglaises d'aviation, il convient de citer la Bristol Aeroplane Co., Ltd., qui débuta dès 1910 dans l'étude et la construction des aéroplanes. Après avoir tout d'abord sorti des biplanes du type H. Farman, elle retarda pas à se consacrer à la réalisation de ses propres conceptions. La Bristol Aeroplane Company, qu'avait précédée la British & Colonial Aeroplane Company, fut fondée par Sir George White et son frère, Mr. Samuel White, qui, vers cette époque, se trouvaient tous deux à la tête d'entreprises s'intéressant à d'autres moyens de transport.

C'est ainsi que, depuis une vingtaine d'années, la Bristol Company n'a cessé de progresser régulièrement et d'occuper une position enviable parmi les grandes maisons d'aviation anglaises. Après la guerre, elle reprit la suite des moteurs "Cosmos," dont elle conserva à son service le chef-dessinateur, Mr. Roy Fedden, et, grâce à la poursuite d'une vigoureuse politique de développement, cette compagnie est parvenue à porter la marque Bristol au tout premier rang des moteurs d'aviation.

En ce qui concerne les appareils, la Bristol Company a créé toute une série de types très heureux, dont le plus récent qu'aient adopté les services de l'Aviation Royale de Grande Bretagne n'est autre que le monoplace de combat "Bulldog." Cet appareil, dont la construction entièrement métallique réunit les formes spéciales étudiées et réalisées par la Bristol Company depuis ces quatre ou cinq dernières années, utilise d'une part le ruban d'acier méplat laminé ou étiré d'après certains profils, et, d'autre part, des tubes en acier étiré sans soudure. Quoique le type particulier de construction mis au point par cette usine de Bristol soit d'une finesse très poussée, sa réalisation concrète n'offre pas de difficulté grâce au montage dans ses vastes ateliers d'un outillage permettant la production en grande série des principales pièces entrant dans la fabrication des avions entièrement métalliques.



Bristol Bulldog single-seater fighter.
Monoplace de combat Bristol Bulldog. Monoplaça de combate Bristol Bulldog.

LA CASA BRISTOL AEROPLANE CO., LTD., constituye una de las primeras firmas británicas de construcción de aparatos de aviación, la cual dió comienzo al diseño y la construcción de aeroplanos en tiempo tan remoto como el año 1910. Sus primeros modelos fueron los biplanos del tipo H. Farman, pero muy poco tiempo después producía aparatos de su propio diseño. La precursora de la sociedad Bristol Aeroplane Company se conocía bajo el título de British & Colonial Aeroplane Company, y fué fundada por Sir George White y su hermano Mr. Samuel White.

La compañía Bristol ha continuado desarrollándose de una manera regular, durante un período de 20 años, y siempre ha mantenido su posición en la primera fila entre las casas británicas dedicadas a la construcción de aparatos de aviación. Después de terminada la gran guerra europea, la compañía Bristol se hizo cargo del activo y pasivo de la empresa constructora de los motores "Cosmos" cuya fusión incluyó la oferta de un puesto a su principal proyectista Mr. Roy Fedden, desde cuya época la compañía ha perseguido una política de desarrollo muy activa la cual ha dado lugar a que los motores Bristol se encuentren hoy día entre los más eminentes de los motores de aviación.

Por lo que se refiere a la construcción de aparatos de aviación, la Compañía Bristol ha producido una serie de tipos que han sido coronados de gran éxito, el último de los cuales que acaba de entrar en el Real Servicio Británico de Aviación es el monoplace de combate "Bulldog." Este aparato incorpora en su diseño las formas especiales de la construcción enteramente metálica que la Compañía Bristol ha desarrollado durante los últimos cuatro o cinco años, y en la cual se ha hecho uso parcial de una tira plana de acero ya sea laminada o estirada conforme a secciones diversas y en parte de tubos de acero estirados del sólido. Este tipo determinado de construcción desarrollado por la compañía Bristol es de una categoría altamente refinada a la par que de manufactura fácil, pues se ha montado una extensa instalación en los talleres para la manufactura en gran escala de las diversas piezas componentes principales para los aparatos de aviación de construcción enteramente metálica.

A highly ingenious multi-spar wing is one of these experiments, and other work is still going on. Any day the Bristol may spring something of a surprise on the aeronautical world.

To serve as an example of Bristol design and workmanship, it would be difficult to choose anything better than the "Bulldog" single-seater fighter. This machine, which is now being built in quantities for the Royal Air Force and other air forces, is an all-metal, and more specifically all-steel machine (as regards its main structure) of the biplane type. Not only high performance, but also extremely good manoeuvrability are features of the "Bulldog," and pilots who have long experience of many types speak with praise of the machine.

In aerodynamic design the "Bulldog" is a straightforward biplane, with a lower wing slightly smaller than the upper, and with a single pair of interplane struts on each side. The trailing edge of the upper wing is cut away so as to improve the pilot's view, which, as his eyes are on the level of the top plane, is very good, both above and below the top plane.

Structurally, the "Bulldog" is mainly a steel machine, the material mostly used being high-tensile steel strip, although a certain amount of solid-steel tube of circular section is used, notably in the forward part of the fuselage. The fuselage comprises three main parts, the front and rear portions, and the

stern frame. The forward end is of tubular construction, and extends from the engine plate to behind the cockpit. There are no bracing wires in this portion of the fuselage, stabilising of the structure being done by diagonal struts. These are attached to the longerons by steel plates.

The rear portion of the fuselage is totally different construction. Here, use is made of steel strip of very light gauge, rolled and drawn to the desired section. The longerons and struts are formed from two steel strips which interlock and form circular cross sections. The strut ends are gripped between the edges of the longeron strips, and secured by riveting. The struts themselves are arranged in "N" or Warren girder formation, so that no bracing wires or tie rods are used in the side frames. The third portion of the fuselage is the stern post assembly which carries the tail, tail trimming gear, etc.

The main fuselage structure is of rectangular section, but deeply-curved fairings bring this up to a streamline form. Hence the use of lower plane wing roots built on to the fuselage structure.

The biplane wings are of the normal two-spar type, with internal drag bracing in the form of tubular struts, and tie rods. The spars are of high-tensile steel strip, and of a section and construction patented by the Bristol company. The wing ribs are of steel channel section, and are riveted to leading and trailing edges, as well as to the rib posts which support them on the spars.

The two petrol tanks are carried in the top plane, one on each side, and the tank bays of the wings are braced by a single diagonal tube which carries the tank and braces the bay. All tail surfaces are of steel construction, as are also the balanced "Frise" ailerons.

The power plant of the "Bulldog" is the Bristol "Jupiter" engine, and either the Series VI or the Series VII can be fitted. With the former engine the gross weight of the machine is 1,500 kg., and with the latter 1,520 kg. When fitted with the "Jupiter" Series VII, the "Bulldog" has a maximum speed (at 13,000 ft.) of 175 m.p.h., and the climb to 5,000 m. (16,500 ft.) occupies but 11.3 min.



Bristol Bullpup single-seater fighter.
Monoplace de combat Bristol Bullpup. Monoplaça de combate Bristol Bullpup.



CIERVA

THE CIERVA AUTOGIRO CO., LTD.,
BUSH HOUSE, ALDWYCH, LONDON, W.C. 2

SEÑOR DE LA CIERVA, a Spanish engineer of note, has been experimenting for a number of years with aircraft obtaining their lift from a system of rotating blades, similar to those of a helicopter, but with the fundamental difference that the blades are hinged to the central vertical spindle, and are free to move upwards under the force of the lift, until they take up an angle, known as the "coning angle," which corresponds to the resultant of the lift force and the centrifugal force on the blades. Señor de la Cierva has termed this form of aircraft an "Autogiro," from the fact that the rotating blades are not driven by the engine, but are caused to rotate merely by the air forces acting upon them when the aircraft as a whole is caused to move through the air by the pull of the airscrew. As the blades continue to rotate, even when the aircraft is descending vertically, the machine cannot stall.

For some years, Señor de la Cierva has been established in England, and his latest type is known as the C.19 Mark III. It is fitted with a 105-h.p. Armstrong Siddeley "Genet-Major" engine, and is a two-seater of the "light aeroplane" class, with a total loaded weight of 1,400 lb. (635 kg.).

The fuselage is a welded steel tube structure, covered with fabric, and the two cockpits are placed under the rotor pyramid and behind it, respectively.

The rotor system consists of four blades hinged to a central hub fitted with ball bearings, and a brake system for slowing down the rotor blades after the machine has landed. The rotor blades themselves are built up of single steel tube spars, wooden ribs, and fabric covering.

Set low on the fuselage, in the place occupied by the lower wing of a biplane, are auxiliary lifting surfaces in the form of small normal wings. These auxiliary lifting surfaces carry the ailerons used for lateral control.

The tail of the Autogiro is of biplane formation, and the horizontal surfaces are so pivoted that they can be rotated upwards through a large angle, when they form a deflector for the propeller slipstream, directing it upwards on to the rotor blades, and setting them in motion preparatory to the machine taking off. Before the machine begins to taxi, the tail surfaces are brought to a horizontal position.

The undercarriage is of very wide track, and the oleo legs have a travel of 8 in., so that their shock-absorbing qualities are good.

Performance figures, etc., are given in the table on p. 1318. These figures do not, however, show the angle of climb, which, as distinct from the rate of climb, is quite remarkably good.

SEÑOR JUAN DE LA CIERVA est un ingénieur espagnol distingué, qui pendant des années s'est consacré à l'étude expérimentale des appareils de vol à sustentation directe. Sa société anglaise, fondée il y a plusieurs années, a déjà construit un certain nombre d'autogires qui ont effectivement volé.

Le principe de sustentation sur lequel repose l'autogire de la Cierva diffère entièrement de celui de l'hélicoptère ordinaire en ce que les pales rotatives ne sont pas mécaniquement reliées au moteur, mais tournent sous l'action des forces aérodynamiques qui agissent sur elles. De la sorte, si le moteur stoppe, le "moulin à vent" continue à tourner et au besoin l'appareil peut descendre presque verticalement. Du fait que la sustentation est en grande mesure indépendante de la vitesse à laquelle avance l'appareil, il s'ensuit que l'autogire ne peut ni entrer en perte de vitesse ni tomber en vrille. C'est donc un appareil très sûr, qui peut atterrir dans un petit espace, car il est en outre muni de freins sur roues. L'illustration représente le Type C.19 Marque III: c'est un avion léger biplace de tourisme, équipé d'un moteur "Genet."

DON JUAN DE LA CIERVA es un notable ingeniero español que ha experimentado durante muchos años con máquinas voladoras de ascenso directo. Su compañía inglesa se fundó hace varios años, habiéndose construido desde entonces varios Autogiros con los cuales se han efectuado vuelos efectivos.

El principio de sustentación del Autogiro del Señor de la Cierva difiere esencialmente del principio del helicóptero ordinario en el hecho de que las paletas giratorias no están accionadas por el motor, sino que giran por la fuerza del viento que actúa sobre ellas. Por consiguiente, si el motor deja de funcionar el "molino de viento" continúa girando y, si se desea, puede hacerse descender a la máquina verticalmente. Del hecho de que el ascenso es en gran parte independiente de la velocidad de avance de la máquina, se deduce que el Autogiro no puede perder su fuerza viva ni hacer barrena. Por lo tanto, es una máquina muy segura y puede aterrizar en un espacio pequeño, pues está provista de frenos para las ruedas. Se da una ilustración del tipo C.19 Mark III, el cual es un aparato ligero de dos asientos destinado al turismo y provisto de un motor "Genet."



Cierva Autogiro C.19 Mark III Light Aeroplane.
Autogire de la Cierva C.19 Marque III.
Autogiro de la Cierva C.19 Mark III.





Civilian two-seater Light Aeroplane.
Biplane léger Civilian.
Aeroplano ligero Civilian de dos asientos.

CIVILIAN

THE CIVILIAN AIRCRAFT CO., LTD.,

HORNINGLOW ROAD NORTH, BURTON-ON-TRENT

LA SOCIÉTÉ CIVILIAN AIRCRAFT CO., LTD., de Burton-on-Trent, est une nouvelle venue dans l'industrie aéronautique britannique. Jusqu'ici elle n'a produit qu'un seul type d'appareil dit "Coupé Civilian." A la suite de l'expérience acquise dans la construction du premier appareil expérimental, la maison mettra prochainement sur le marché un "Coupé Civilian," Marque II, qui présentera un certain nombre de perfectionnements. L'appareil est de construction mixte, la partie arrière du fuselage étant en bois, tandis que la portion antérieure est en tubes d'acier. L'aile est entièrement construite en bois, avec revêtement en contreplaqué. Les ailes sont repliables.

Le groupe moto-propulseur du "Coupé Civilian" est le moteur A.B.C. "Hornet" à quatre cylindres refroidis par l'air et opposés deux à deux. L'appareil est muni de freins sur roues, permettant de l'amener à l'arrêt dans un très petit espace.

LA EMPRESA CIVILIAN AIRCRAFT CO., LTD., de Burton-on-Trent, Inglaterra, ha entrado recientemente en la industria de la aviación británica. Solo ha producido hasta ahora un tipo de máquina, la cual se conoce como Civilian Coupé. En vista de la experiencia adquirida con la primera máquina experimental, el aeroplano Civilian Coupé "Mark II" saldrá pronto al mercado y contendrá varias mejoras. La máquina es de construcción mixta. La parte posterior del fuselaje es de madera, mientras que la parte anterior es de tubo de acero. La construcción del ala es enteramente de madera, con una cubierta de madera de tres dobleces. Las alas son construídas para plegarse.

La instalación motriz del Civilian Coupé consiste de un motor A.B.C. "Hornet," de cuatro cilindros y refrigeración por aire, con dos cilindros colocados frente a los otros dos. Se han fijado frenos para las ruedas con el fin de que la máquina pueda pararse en un espacio corto.

THE Civilian Coupé is one of the latest light aeroplanes to be put on the market. Mr. H. D. Boultbee, the designer of the machine, and a Director of the Company, has been connected with the practical side of the aircraft industry for more than twenty years. An experimental machine has been flying for eighteen months, and from the experience gained with this all the "teething troubles" have been eliminated in the production type, which will be ready for delivery early in the spring of 1931.

The Civilian Coupé Mark II is a high wing cabin monoplane with folding wings. It is a two-seater light aeroplane and the pilot's and passenger's seats are slightly staggered in relation to each other in order to give sociable seating without excessive width.

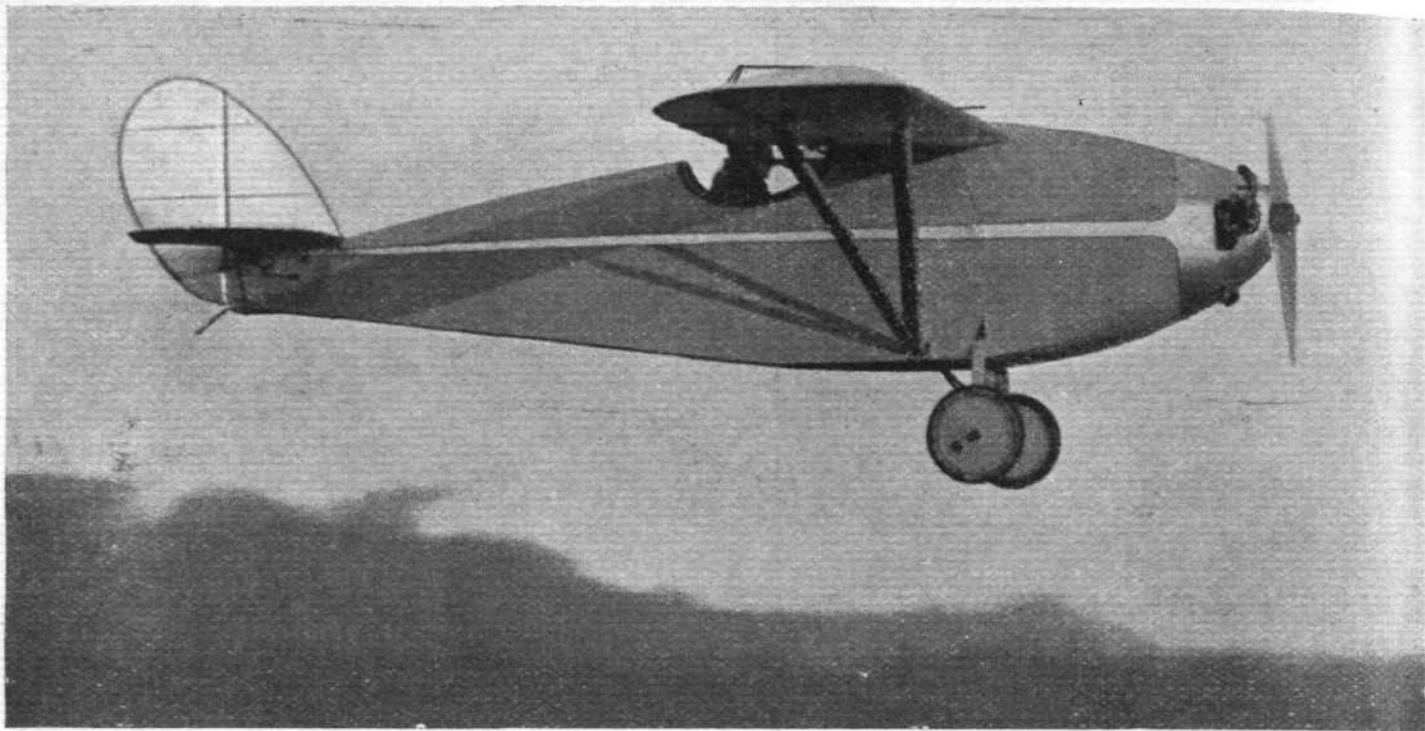
A remarkable feature of the machine is the view obtained from the pilot's seat. Tapered wing roots and a large window in the centre section allow the pilot to see clearly while doing a turn, and there is a complete circle of vision on eye-level and below. Owing to the narrow engine cowling the forward and downward view on each side of the engine is excellent. The horizontal arrangement of the cylinders in the "Hornet" enables the cowling to be dropped towards the front, and so provides an excellent view straight ahead, where in most machines the view is likely to be somewhat obscured.

The fuselage is of mixed construction, in that the rear portion is constructed of 3-ply planking on spruce members, while the forward part, where the greater loads are concentrated, is built up of steel tubes bolted together. The whole of the rear fairing on top of the fuselage is easily detachable for inspection. The wings, tail plane, elevators, fin and rudder are all covered with plywood.

The undercarriage is of the divided type, fitted with Dunlop wheels and Bendix brakes, the brakes being capable of being operated either together or independently. A tail wheel with castor action is fitted.

The power plant, which has been standardised for the Civilian Coupé Mark II, is the 85 h.p. A.B.C. "Hornet." Originally some difficulty was experienced in designing a suitable engine mounting, and considerable vibration was experienced. This trouble has now been entirely overcome, and in the production type of machine the engine is said to run very smoothly. Purchasers desiring higher performance can obtain the machine fitted with the Armstrong Siddeley "Genet Major," of 105 h.p. With that engine, however, the price is slightly higher, i.e., £780 as against £650 for the Hornet engined machine.

The figures given in the table on page 1318, show that the Civilian Coupé has a top speed of 105 m.p.h., a cruising speed of 85 m.p.h., and an initial rate of climb of 550 ft./min. The landing speed claimed is below 40 m.p.h.



COMPER

THE COMPER AIRCRAFT CO., LTD.,

HOOTON PARK AERODROME, CHESHIRE

Comper Swift single-seater (A.B.C. Scorpion engine).

Monoplace Comper Swift (moteur A.B.C. Scorpion).

Monoplaza Comper Swift (motor A.B.C. Scorpion).

WHEN he first designed the little "Swift" single-seater light 'plane, Flight-Lieut. N. Comper had in mind a machine which, although cheap in first cost and of low running cost should have a good performance, and should above all else be very manoeuvrable. In other words, a machine on which those who desired something of the "vim" of machines of the single-seater fighter class, could practice at very small expense. The machine should also be very suitable for use by flying clubs and flying schools, where, once the pupil had passed the dual stage, he could continue solo on the "Swift" at very low cost, and thus relieve the club machines from dual instruction to other pupils.

In order to provide a choice of performance and price, the Comper Aircraft Company decided to produce the Swift with three different engines. That fitted with the British Salmson of 50 h.p. may be regarded as the standard, or general-purpose type, having sufficient performance to satisfy most pilots and being low enough in price to find a ready market. For those who desire the cheapest machine possible, in conjunction with a reasonably good performance, the type fitted with the 40 h.p. A.B.C. "Scorpion" engine has been produced, and this machine, although it has a very good performance, *i.e.*, top speed 100 m.p.h., and initial climb of 500 ft./min., has the astonishing mileage of 40 miles per gallon of petrol. This is at a cruising speed of 85—90 m.p.h. Owing to the low consumption of the engine the range of the "Scorpion"-engined "Swift" is 360 miles at cruising speed..

Finally, there is the "Pobjoy" engined "Swift," which has a perfectly astounding performance. It is a little dearer than the other two models, but for the pilot-owner who wants something really fast and exceptionally manoeuvrable, the "Pobjoy"-engined model would be difficult to beat. How amazing this little machine is may be realised when it is pointed out that the top speed is about 145 m.p.h. and the initial climb 1,400 ft./min., while the cruising speed is 120 m.p.h., and the landing speed about 40 m.p.h. Thus, the speed range is considerably more than 3½ to 1.

The prices of the three models are "Scorpion Swift," £400; "Salmson Swift," £475, and "Pobjoy Swift," £525. These prices include all extras, such as a full set of instruments (except compass), but including time-of-trip clock, cockpit cover, engine cover, suit case, picket screws, a full set of tools and log-book.

The fuselage of the "Swift" is in three portions bolted together, and the joint between the portions is covered over with a strip of doped fabric about 1½ inches wide. Thus, when a thorough inspection of the fuselage is desired, it is only necessary to tear off the fabric strips, when the four bolts can be undone and the complete fuselage portion thoroughly inspected.

The wings of the Swift have wooden spars and ribs, and are strut braced to the fuselage. The wings are designed to fold, and this operation only requires the withdrawal of two locking pins from the front spar and can be carried out literally in a few seconds. No disconnection of the aileron controls is necessary and no jury struts are required.

POUR le moment la société Comper Aircraft Co., Ltd., se concentre sur la production de petits avions légers monoplaces peu coûteux à acheter et à utiliser. Il y a un modèle qui se fabrique en grande série, mais qui peut se fournir sous trois formes, ou plutôt avec trois types différents de moteur. A part cela les trois appareils sont presque identiques : ce sont de très petits monoplans à vergues construits principalement en bois. Le fuselage est profond, mais étroit, et tout en protégeant le pilote contre le courant d'air, lui laisse d'excellentes vues.

Celui de moindre puissance, le Comper "Swift," est équipé du moteur A.B.C. "Scorpion" de 40 cv.; c'est aussi le meilleur marché de tous. Ensuite vient le "Salmson-Swift," qu'équipe un moteur Salmson anglais de 50 cv. Et enfin il y a le "Pobjoy Swift," qui est actionné par un moteur Pobjoy à refroidissement par air de 75 cv. Naturellement, la performance est proportionnelle à la puissance du moteur, et le "Pobjoy Swift" se comporte presque comme un avion de combat monoplace de grande puissance.

Les prix des trois modèles sont : "Scorpion Swift" £400, "Salmson Swift" £475, et "Pobjoy Swift" £525.

LA SOCIEDAD COMPER AIRCRAFT CO., LTD., se está dedicando, por el momento, a la producción de aeroplanos tipo ligero de pequeñas dimensiones, del modelo monoplaza los cuales son poco costosos en cuanto a la adquisición y su entretenimiento. Uno de los modelos se construye por el método de producción en serie pero puede obtenerse en tres formas, o más bien dicho, provisto de uno de tres clases de motores. Por lo demás, los tres modelos son casi idénticos, siendo monoplanos de tipo muy



(FLIGHT Photo.)

Comper Swift light aeroplane (Pobjoy engine).

Avion léger Comper Swift (moteur Pobjoy).

Aeroplano ligero Comper Swift (motor Pobjoy).

pequeño con atirantamiento por montantes de construcción principalmente de madera. El fuselaje es bastante profundo pero angosto y, si bien protege al piloto contra la corriente de aire, proporciona igualmente una buena visibilidad.

El avión Comper "Swift" de menor potencia está provisto de un motor A.B.C. "Scorpion" de 40 CV., y constituye el más barato de los tres modelos. Luego le sigue el aparato "Salmson Swift," el cual está provisto del motor Salmson británico de una potencia de 50 CV. Por último viene el modelo "Pobjoy Swift," el cual está dotado del motor "Pobjoy" de 75 CV. con enfriamiento por aire. Como es de suponerse, la *performance* de los aparatos se halla en relación con la potencia en caballos de fuerza, si bien el modelo "Pobjoy Swift" puede maniobrarse casi en la misma forma que un monoplaza de combate de alta potencia.

Los precios de estos tres modelos son como sigue:—"Scorpion Swift," £400; "Salmson Swift," £475 y el "Pobjoy Swift," £525.

The instruments are very carefully arranged, and the one instrument essential to the new solo pupil: the air speed indicator, is separated from the other instruments and placed on the rear spar in line with the pilot's eyes. On the rear spar on the other side is mounted the altimeter. A neat oval instrument board is placed in the centre of the dash, with a tray for maps and gloves, etc., under it, and a very full equipment of instruments is provided. The pilot's seat is supported by hinges at the back and by wires from the front edge. This arrangement allows for adjustment to suit the individual owner.

In the deck fairing behind the cockpit is a large locker which will accommodate a suit case measuring 23 in. by 13 in. with a depth of 6 in. A longer space in the fairing is intended to provide room for golf clubs, tennis rackets, or other light, but long, articles.



Comper Swift light aeroplane single-seater (50-h.p. Salmson engine)

Monoplace léger Comper Swift (moteur Salmson de 50 CV.).

Monoplaza ligero Comper Swift (motor Salmson de 50 CV.).



(Flight Photo.)

Aerial view of De Havilland Works.
Vue aérienne des usines De Havilland.
Vista aérea de los talleres De Havilland.

DE HAVILLAND

THE DE HAVILLAND AIRCRAFT CO., LTD.,
STAG LANE AERODROME, EDGWARE, MIDDLESEX

THE largest British aircraft firm devoted exclusively to the production of civil aircraft is the De Havilland Aircraft Co., Ltd. Capt. Geoffrey De Havilland is one of Great Britain's pioneers of aviation, having designed and built his first machine somewhere around 1908 or 1909. For some years he was at the Royal Aircraft Factory at Farnborough, where he designed some successful machines. On the outbreak of war he became chief designer of the Aircraft Manufacturing Company, and there produced the types which became famous during the war, such as the D.H. 4, D.H. 5, and D.H. 9, to mention but three types which achieved success. The total number of types designed by Capt. De Havilland must by now exceed 100, although admittedly all of these have not been built but a few merely projected.

After the war, when the Aircraft Manufacturing Company closed down, Capt. De Havilland established his own firm at Stag Lane, Edgware. With him he took several of his colleagues from the old Airco firm, among whom it will suffice if we mention Capt. C. C. Walker, who is now chief engineer of the firm, Mr. Hearle, who is now general manager, Mr. Hagg, in charge of design, and Mr. St. Barbe, now business manager of the De Havilland Company.

The start made at Stag Lane was a modest one. A few small, and not too well-built sheds were in existence, and an aerodrome not in the best condition. However, if the premises were not palatial, they were at least cheap, and best of all there was plenty of room for expansion later, should expansion prove necessary. And it did prove necessary. At first, a few military types were designed, and some of them produced. Then, when it was found that commercial air lines could not be operated economically with wartime machines, even when slightly modified to turn them into what was then regarded as commercial aeroplanes, the De Havilland Company set to work to produce the best machines possible at that time for commercial use. A number of types were designed, and most of them were built. It is only necessary to recall a few: the D.H. 34, a single-engined cabin biplane, came into use on the London-Continent lines. The D.H. 54 was another. The D.H. 50 was a smaller edition with "Puma" engine, and for several years was regarded as a very efficient passenger machine. There was a large cantilever monoplane which was not quite successful, but which, one can see now, must have taught the designers a great deal which they could make good use of later, and the expenditure on which was therefore by no means wasted. More recently, the "Hercules," a three-engined passenger machine for Imperial Airways, was produced, and the type is still in use on the Cairo-Karachi section of the England-India air route, and is to be transferred to certain African sections of the London-Cape Town route next year.

It was, however, the production of the "Moth" which laid the foundation of the greatness of the house of De Havilland. At a time, only a few years ago, when the rest of the British aircraft world (or at least a considerable portion of it) was wasting its time on light aeroplanes of inadequate power

LA "DE HAVILLAND AIRCRAFT COMPANY" est de loin la maison anglaise la plus importante s'occupant exclusivement de la fabrication d'avions pour transports civils. Le Capitaine Geoffrey de Havilland est le pionnier des constructeurs d'avions britanniques, et a fait de cette branche son occupation principale depuis 1910. C'est lui qui, comme constructeur des Établissements "Airco," a mis à son actif une longue série d'appareils militaires dont la valeur s'est hautement affirmée. Après la guerre, il a fondé un établissement à lui à Stag Lane, d'où sont sortis maints types d'aéronefs, dont plusieurs se sont acquis une renommée universelle. L'espace nous manque pour en établir ici une nomenclature complète, et nous ne pourrions que donner quelques brefs renseignements au sujet de quatre types, allant de l'appareil léger biplace aux puissants avions pour le transport de voyageurs.

L'appareil qui a le plus fait pour conférer aux Établissements De Havilland une renommée universelle est incontestablement le "Moth." Depuis l'apparition du premier "Moth," il y a quelques cinq ans, ce type a été soumis à un procédé de perfectionnement incessant, qui en a fait un des meilleurs appareils à deux places du monde. Il existe deux variétés de "Moth," une à armature en bois, et une autre à fuselage en acier. La première est un peu moins chère. Il y a, en outre, certains types subordonnés de moindre importance, comme le "Moth" à toiture en verre et l'hydroplane à flotteurs jumelés. Malgré leurs variantes de construction, tous les "Moth" conservent les lignes caractéristiques, familières dans le monde entier. Le groupe propulseur normalement monté à bord comporte un moteur De Havilland "Gipsy."

Le "Puss Moth" est un modèle De Havilland plus récent, et d'ailleurs le plus récent de tous. C'est un monoplan à ailes surélevées, dont les occupants sont logés dans une petite cabine éclairée de manière excellente

par de très grandes fenêtres. Grâce au fait que le moteur du "Gipsy III" est de type "inverti," l'on jouit, de la cabine du "Puss Moth," d'une remarquablement bonne vue vers l'avant, tandis que les baies pratiquées tant dans les côtés que dans le toit de la cabine fournissent aux occupants un rayon d'observation dans presque toutes les directions. Le "Puss Moth" peut, en cas de besoin, être agencé à trois places, moyennant une certaine réduction de la quantité d'essence transportable.

Le "Puss Moth" possède un fuselage en tubes d'acier soudés, recouverts de toile, et ses ailes sont en bois. Les plans de monoplane se replient pour mise au hangar de la machine et sont entretoisés par jambes de force s'appuyant sur le fuselage. Les montants du châssis d'atterrissage sont fuselés, pouvant être pivotés de manière à présenter au vent leur surface maxima, et à faire office de frein à air. Ce dispositif permet d'atterrir avec le "Puss Moth" dans un champ assez restreint, ce qui, en vue de l'angle de plané de la machine, serait sinon impossible.

Le "Hawk Moth" De Havilland est destiné normalement au transport de quatre personnes, le pilote et trois passagers. Il est, cependant, possible en restreignant quelque peu son rayon d'action, d'affecter cette machine au transport de six personnes. Elle est de construction mixte, c'est-à-dire à fuselage en tubes d'acier, avec ailes en bois recouvertes de toile, tout comme le "Puss Moth". Elle se prête au montage de divers moteurs, conformément aux exigences de l'acheteur, les plus fréquemment employés étant le "Lynx" à transmission par engrenages Armstrong Siddeley, et le "Whirlwind" Wright. La cabine du "Hawk Moth" est très confortable, et fournit, grâce à la position élevée des ailes, une vue excellente. Le poste du pilote est au siège de gauche à l'avant.

Le "Hawk Moth," de même que le "Puss Moth" et le "Gipsy Moth," existe sous la forme d'hydravion muni de flotteurs en duralumin, construits par les Établissements Short Brothers à Rochester.

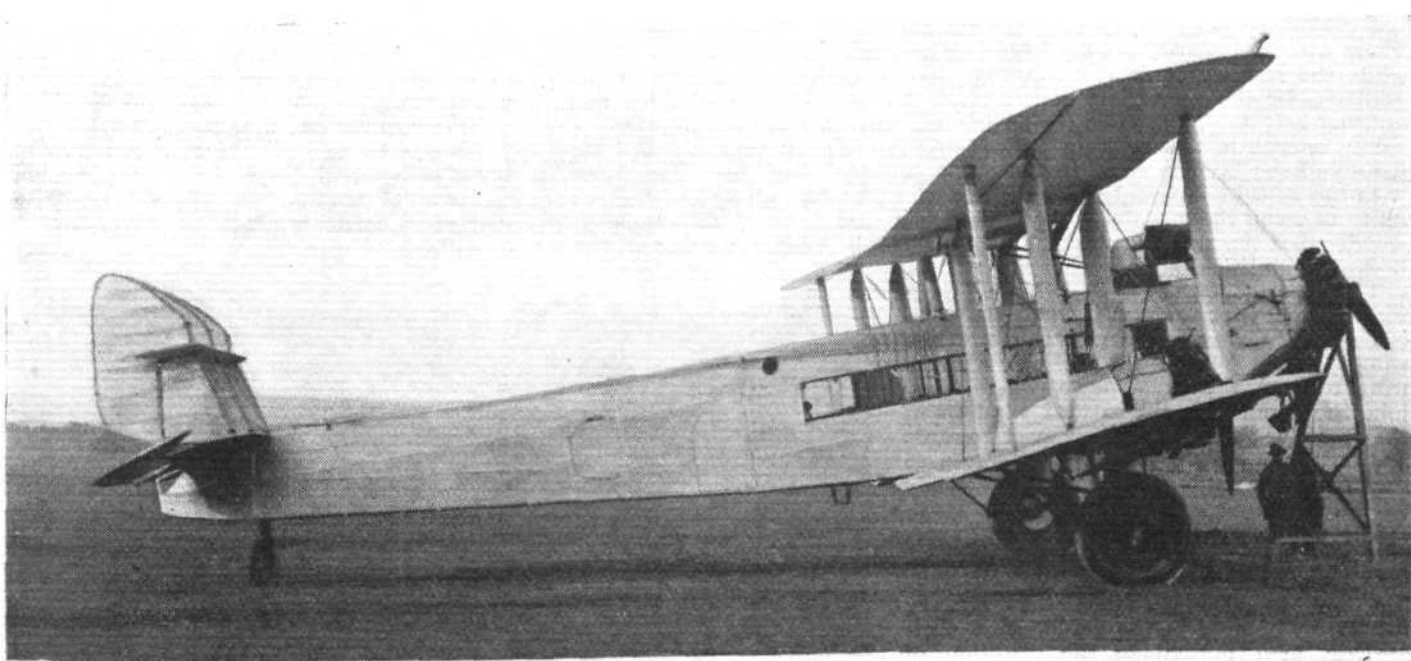
Le "Giant Moth" De Havilland, ou D.H.61, est un biplan à moteur unique, de type Bristol "Jupiter" ou Armstrong-Siddeley "Jaguar." Cet appareil se prête au transport de 6 à 8 passagers, et a déjà fait beaucoup de service en Australie. Comme

and, therefore, so light and flimsy as to be of little use in the hands of an inexperienced pilot, the De Havilland firm said, in effect: "We do not believe that the 1,100-c.c. engined machine is the solution. Now here is what we think a light aeroplane should be like." And they produced the first "Moth," a little biplane of sturdy construction, fitted with a Cirrus I engine of some 65 h.p. The rest of the aviation community boggled at the high power, and freely expressed the belief that no one would be able to afford to run a machine with so much power. Time has shown that the De Havilland view was correct. Not only has the "Moth" become the most outstanding success, but the power of engines has continued to increase, until now 120 h.p. is quite an ordinary power plant. One may regret that the early ideal of the light aeroplane has never been realised, but the British light aeroplane, as we know it to-day, and which is the direct outcome of the production of the first "Moth" is popular the world over, and is a thoroughly reliable and safe type of aeroplane, and the fact that thousands are in use proves that there are plenty of people who can afford to run machines with engines of more than 100 h.p.

Some years ago, when it became evident that the light aeroplane market would absorb quite large quantities of aircraft, the De Havilland Company decided to add to its aircraft factory an aero engine factory. Major Halford agreed to design an engine, and the "Gipsy I" was the result. After some very minor teething troubles, this engine became standardised, and soon established a reputation for itself. After a short time it was followed by the "Gipsy II" and "Gipsy III." All three types are dealt with in the engine section of this issue of FLIGHT.

The original "Moth" was of wood construction, and for several years was regarded as quite satisfactory as regards its structural materials. When the aircraft industry in general turned over to metal construction as a result of the Air Ministry's decision to use nothing but all-metal aircraft for service types, the view gradually spread that all-metal was essential also in civil types. We are quite sure that few of those who insisted upon metal construction were at all clear why they did so. Metal construction seemed to be the thing, and so metal construction it had to be. That, in the first instance, the decision to demand metal was due to considerations relating to the question of suitable timbers in time of war, seems to have been almost forgotten by now. Yet that was the case. Originally, there was not, we believe, any idea that metal construction would be likely to be lighter than wood construction. In actual fact, it has so proved in some (although by no means in all) instances, but that was not generally foreseen. For civil aircraft, at home at any rate, the old form of construction was quite satisfactory. No one will deny that, in very hot climates, or in climates where extremes of heat are to be met with metal construction does do away with trouble due to shrinkage, and with the opening of plywood in humid climates. But to this day there are many cases in which metal is asked for when wood would do as well and be cheaper. However, when the demand arose for metal construction, the De Havilland firm, although by then organised for mass production in wood, at once realised that whether the demand was reasonable or not, it had to be met, and set to work to produce a metal version of the "Moth," or at any rate a partly-metal version. Curiously enough, it was the lack of spruce for wing spars which initially led to the insistence on metal construction. Yet that is the very component which is still in the part-metal "Moth," made of wood.

For the fuselage construction De Havilland's chose welding, and by now large numbers of welded steel tube fuselages have been in use for considerable periods without giving any trouble. That may be due to the fact that as



De Havilland Hercules passenger carrier (three Bristol Jupiters).

(FLIGHT Photo.)

Avion à voyageurs De Havilland Hercules
(trois moteurs Bristol Jupiter).

Avion De Havilland Hercules, para pasajeros
(tres motores Bristol Jupiter).



De Havilland Gipsy-Moth two-seater light aeroplane. (FLIGHT Photo.)
 Biplane léger De Havilland Gipsy-Moth.
 Aeroplano ligero De Havilland Gipsy-Moth, de dos asientos.

practised by De Havilland's, the welding process is not of the absolute simplest possible form, the welded joints being, wherever considerable concentrated loads are met, reinforced with "finger plates" to strengthen the joint. Both round section and square section tubes are used in the fuselage construction, the latter being very convenient for the attachment of various items.

The wings of De Havilland machines are, as we have already said, built of wood, with the exception of a few fittings, interplane struts, etc.

The Gipsy Moth.—This machine is now available in two forms: the "Standard," which has wood fuselage, and the "Special," which has welded steel tube fuselage. Both models can be supplied either fitted with the 100-h.p. "Gipsy I" engine, or with the 120-h.p. "Gipsy II." In both models the seats are arranged in tandem, and dual controls permit of flying the machine from either seat, and of giving flying instruction on it. The petrol tank is mounted in the top plane centre-section, giving direct gravity feed to the engine. The undercarriage is of the divided type, and springing is by rubber blocks in compression. If desired, the machine can be fitted with Handley-Page automatic slots at extra cost. The performance figures (in the metric system) are given in the table on p.1318. According to the engine fitted, the top speed is 100-107 m.p.h., and the cruising speed at 1,000 ft. 92-99 m.p.h.

In addition to the choice provided by the "Standard" and "Special" models with "Gipsy I" or "Gipsy II" engines, the purchaser of a "Moth" has the further advantage of being able to have a landplane or a seaplane, both models being supplied as twin-float seaplanes with duralumin floats made by Short Brothers. A number of "Moth" seaplanes have been built, and are in service in various parts of the world, and they have given as good an account of themselves as have the landplanes. The tare weight of the seaplanes is, of course, a little greater than that of the landplane, but the performance is very nearly the same.

The Puss Moth.—It is no exaggeration to say that a new standard in aircraft for the private owner was set when the De Havilland Company produced the "Puss Moth." Not only was the aerodynamic efficiency of the first experimental machine (which by the way was of all-wood construction) remarkably good, but the inverted "Gipsy III" engine, the enclosed cabin, and the general lay-out was such that the noise in the cabin was reduced to an extent not previously attained, so that the machine was remarkably comfortable. There was no draught, and the large windows gave plenty of light and view, while the absence of noise made conversation possible in comfort except, perhaps, for the very short period when the machine was climbing to its cruising height. As soon as the engine was throttled to cruising speed, the cabin became less noisy than a London tube railway carriage. All these features have been retained in the production model of the "Puss Moth," with the added comfort which a slightly wider fuselage gives, and the possibility of using the machine, on occasion, as a three-seater. It is thus small wonder that the machine attained instant success, and is now being produced in large quantities.

The fuselage of the "Puss Moth" is a welded steel tube structure, while the wing is built with wooden spars and ribs. The wing is placed high on the fuselage, and the wing roots are thinned down where they join the top longerons, so that windows in the roof give an excellent view even upwards and outwards. The wing is strut-braced to the fuselage, and designed to be easily folded.

The undercarriage is of the divided type, and the telescopic legs run to the top longerons. The fairings over the telescopic legs are so arranged that they can be turned, by a lever in the cabin, with their greatest area normal to the direction of flight, and thus act as efficient air brakes. This is a very real advantage, as the gliding angle of the machine is so fine that it might otherwise be difficult to land in a small field.

le "Hawk Moth," le "Giant Moth" peut être muni de flotteurs au lieu de roues d'atterrissage. Quoique cette machine ne soit pas encore couramment sur le marché, ses constructeurs sont en mesure de la fournir sur demande. Sa performance est excellente, et elle est très économique en exploitation, en vue de son bas coefficient de consommation d'énergie par tête de voyageurs transportés.

En matière d'avions pour usages commerciaux, la "De Havilland Aircraft Co." produit le "Hercules," biplan à trois moteurs de type "Jupiter" Bristol. Cette machine est à fuselage en tubes d'acier et à ailes en bois, et sa capacité de transport est de 7 ou 8 passagers, sans compter une quantité considérable de courrier, etc. Ce type est en usage, depuis de nombreuses années, sur la section du Caire à Karachi de la ligne aérienne de l'Inde, et sera mis en service, l'année prochaine, sur certaines sections de la ligne aérienne de l'Afrique du Sud. Des machines "Hercules" ont également été en service, dans une très grande mesure, en Australie, sur la ligne de Perth à Adélaïde.

DE todos las casas británicas que se dedican exclusivamente a la construcción de aviones para aplicaciones civiles la De Havilland Aircraft Company es con mucho la más importante. El Capitán Geoffrey de Havilland ha ido siempre a la vanguardia en la industria aeronáutica británica, habiéndose ocupado activamente en proyectar aeroplanos desde 1910. Como proyectista principal de la casa Airco, ideó una large serie de aviones militares de reconocido éxito. Después de la Gran Guerra fundó su propio establecimiento en Stag Lane, y de allí han salido un buen número de tipos de aeroplano, muchos de los cuales se han granjeado fama mundial. Nos falta el espacio para enumerarlos todos aquí, y tan sólo podemos tratar brevemente de cuatro tipos que varían entre el pequeño avión ligero de dos asientos y el gran aparato comercial para el transporte de pasajeros.

El aparato que sin duda alguna más ha hecho para hacer famosa en todo el mundo a la casa De Havilland es el "Moth." Desde la aparición del primer Moth, hace unos cinco años, este tipo ha ido perfeccionándose, hasta que ahora es uno de los mejores aparatos ligeros de dos asientos en el mundo. El "Moth" se construye en dos variantes: una de armazón de madera, y otra con fuselaje de metal. El primer tipo es un poco más barato. Además, hay varios tipos subordinados de menor importancia, tales como por ejemplo, el "Moth" con techo de vidrio, y el hidroavión con flotadores gemelos. En todas sus formas, el "Moth" conserva las líneas características que ahora son conocidas en todo el mundo. El aparato propulsor empleado corrientemente es el motor De Havilland "Gipsy."



De Havilland Puss Moth 2-3 seater light aeroplane. (FLIGHT Photo.)
 Avion léger De Havilland Puss Moth à 2 ou 3 places.
 Aeroplano ligero De Havilland Puss Moth, de 2-3 asientos.



Quadruplace De Havilland Hawk Moth
(moteur Lynx).

De Havilland Hawk Moth, 4-seater (Lynx engine).

Avión De Havilland Hawk Moth, de
cuatro asientos (motor Lynx).

El "Puss Moth" es un tipo más reciente, antes bien el más reciente de los aviones De Havilland. Es un monoplano de alas altas, con la tripulación encerrada en una cabina pequeña, muy bien iluminada por ventanas muy grandes. Estando invertido el Motor "Gipsy III," la vista desde la cabina del "Puss Moth" es muy buena mirando hacia adelante, y las ventanas en los costados y el techo de la cabina dan una buena vista en casi toda dirección. Si se desea, puede disponerse el "Puss Moth" como aparato de tres asientos, reduciendo algo la cantidad de combustible transportada.

El "Puss Moth" tiene un fuselaje de tubos de acero soldados, recubierto de tela, y las alas son de madera. Las alas de monoplano pueden plegarse hacia atrás para colocar el aparato en su garage, y están atirantadas al fuselaje. Los montantes del tren de aterrisaje son fusiformes y pueden ser girados para presentar su superficie máxima al viento y hacer así el oficio de freno de aire. Esto hace posible tomar tierra con el "Puss Moth" en un campo relativamente pequeño, lo que, dado el ángulo de planeo del aparato, podría de otro modo ser imposible.

El "Hawk Moth" De Havilland es destinado normalmente al transporte de cuatro personas, es decir del piloto y de tres pasajeros. Reduciéndose algo su radio de acción, el aparato puede, sin embargo, servir para el transporte de seis personas. Como el "Puss Moth," el "Hawk Moth" es de construcción mixta, con fuselaje de tubos de acero soldados y alas de madera, recubiertas de tela. Puede ser dotado con distintos motores, según las necesidades del comprador, siendo los más frecuentemente usados el "Lynx" de Armstrong Siddeley con transmisión por engranajes, y el "Whirlwind" de Wright. La cabina del "Hawk Moth" es muy cómoda, y gracias a lo elevado de sus alas, la vista es excelente. El piloto ocupa el asiento delantero a la izquierda.

El "Hawk Moth," lo mismo que el "Puss Moth" y el "Gipsy Moth," puede suministrarse bajo la forma de hidroavión, con flotadores de duraluminio contruidos por Short Brothers de Rochester.

El "Giant Moth," o D.H. 61, de De Havilland, es un biplano propulsado por un solo motor que puede ser del tipo "Jupiter" de la casa Bristol o "Jaguar" de Armstrong Siddeley. Lleva de 6 a 8 pasajeros, y se ha usado mucho en Australia. Como el "Hawk Moth," el "Giant Moth" puede ser dotado de flotadores en lugar de ruedas. Si bien este aparato no se construye actualmente, la Compañía puede suministrarlo a quien lo pida. Su rendimiento es bueno y es muy económico de explotar, pues el gasto de potencia por persona transportada es reducido.

By using the air brakes the gliding angle is made less flat, and it becomes much easier to bring the machine in. Shortly a new type of undercarriage, with independently-operated Bendix brakes and low-pressure "air wheels," in combination with a tail wheel, will shortly be available. This will be a great advantage in taxiing on rough ground and manœuvring in a confined space.

The cabin of the "Puss Moth" provides luxurious comfort for two. Normally, the pilot sits in front and the passenger immediately behind him. Dual controls are provided, so that the machine can be used for school work. If the machine is wanted to carry two passengers, the rudder bar and control column in front of the back seat are removed, the seat is slid to the side of the cabin, and a folding seat is put in slightly staggered in relation to the other. A very complete set of instruments is provided. A large door in each side of the cabin makes it possible to enter or leave from either side.

The inverted "Gipsy III" engine is completely cowled in, and the nose of the machine in consequence looks extremely neat. Petrol is carried in two tanks in the wing, and feed is by gravity. Two tankages are standardised.

The "Puss Moth" can also be supplied as a twin-float seaplane, and it may be remembered that not long ago Col. The Master of Sempill, after a tour of the Baltic and Scandinavia, flew across the North Sea from Norway to Scotland in one of these machines.

The maximum speed of the "Puss Moth" as a landplane is 128 m.p.h., and the cruising speed is about 105-110 m.p.h. The seaplane version has a top speed of 125 m.p.h.

The "Hawk Moth."—This machine was actually produced before the "Puss Moth," but being a larger machine with more powerful engine it does not have such a wide market as the smaller machine, and so less has been heard of it hitherto. It is of generally similar construction to the "Puss Moth," but is a good deal larger, and the wing bracing is arranged in a different manner. The machine is normally a four-seater, and is thus suitable for "feeder line" work, or for air routes where the traffic does not justify the use of a large multi-engined aeroplane. Two fuel tankages have been standardised, and when the smaller of the two is used, i.e., when the range is shortened, the machine can be used to carry 5 or 6 passengers.

The "Hawk Moth" is supplied with two different power plants: The Armstrong-Siddeley geared "Lynx" and the American Wright "Whirlwind." The "Hawk Moth" is also supplied as a twin-float seaplane. With the "Lynx" engine it has a top speed, as a landplane, of 128 m.p.h., and a cruising speed of 110 m.p.h. As a seaplane the cruising speed is 105 m.p.h. and the maximum speed 125 m.p.h. With the smaller tankage the pay load is 958 lb., and with the larger tankage 690 lb. The range at cruising speed is 280 miles with 35 gallons, and 560 miles with 70 gallons.

The "Giant Moth."—This is the D.H.61, renamed to bring it into the "Moth" family. It is a single-engined biplane designed to carry passengers or freight, and is fitted either with the Armstrong-Siddeley "Jaguar" or the Bristol "Jupiter" engine. Normally, the machine has accommodation for 6-8 passengers. It has been used for a number of years by an Australian operating company, and like other De Havilland machines, it can be supplied as a seaplane.

The "Hercules."—First produced in 1926, the "Hercules" was designed for use on the Cairo-Baghdad and later Baghdad-Karachi sections of the air route to India. The "Hercules," as used on the trans-desert air route, has seating for 7-8 passengers only, the rest of the space being utilised for mails. The power plant consists of three Bristol "Jupiter" engines. It may be recollected that when the first "Hercules" was flown out to the east, Sir Samuel Hoare and Lady Maud Hoare were among the passengers. Under the new programme of Imperial Airways, Ltd., the "Hercules" machines will be transferred, in 1931, to sections of the Cairo-Cape Town air route. Whether the full cabin space will then be used for passengers is not known at present.



Desoutter Monoplane Mark I. (Hermes engine.)
Monoplan Desoutter Marque I (moteur Hermes).
Monoplano Desoutter Mark I (motor Hermes).

DESOUTTER

DESOUTTER AIRCRAFT COMPANY, LTD.,
CROYDON AERODROME, LONDON, S.W.

ALTHOUGH of French descent, Mr. Marcel Desoutter's aeronautical career has been spent in England. Before the war he was one of the band of famous pilots at Hendon, where he used to delight the crowds with his fine handling of the Blériot monoplane. As a result of an aeroplane accident, Mr. Desoutter lost one of his legs, and after making for himself a very efficient artificial leg, he established, with his brother Charles, a company for the manufacture of artificial legs, which company attained a considerable size during the war.

For some years after the war Mr. Desoutter was away from the aircraft industry, but returned to it a couple of years ago as a manufacturer of the Koolhoven F.K. 41 3-seater cabin monoplane. The machine was re-designed to a considerable extent, and attained almost immediate success. The first machine, the Mark I, was fitted with the Cirrus "Hermes" engine, and was sold in large numbers to National Flying Services and others. This machine is almost entirely of wood construction, both the fuselage and the wings being planked with this material. The cabin has accommodation for pilot, and two passengers, the pilot sitting in front and the two passengers side by side behind him. An undercarriage of wide track is fitted, so that the likelihood of turning the machine over on the ground is extremely remote.

Last year, shortly before the King's Cup Air Race, Mr. Desoutter produced a new version of his monoplane, which became known as the Desoutter Mark II. This machine, although generally similar to the earlier model, incorporated several improvements, notably in the tail surfaces, and was fitted with a De Havilland Gipsy III inverted engine. The forward view in the Mark I Desoutter was by no means bad, but the fitting of the inverted engine improved it still further, and in the Mark II the view is quite exceptionally good.

Associated with Mr. Desoutter is Mr. G. H. Handasyde, who is another old-timer, who before the war was a partner at Brooklands in the firm of Martin and Handasyde, who produced some interesting monoplanes and later during the war period some very efficient biplanes.

The main data relating to the Desoutter monoplanes will be found in the table on page 1318.

MARCEL DESOUTTER, bien que d'extraction française, a déployé toute sa carrière aéronautique en Angleterre. Avant la guerre, il était déjà très connu comme pilote de monoplans Blériot à Hendon, quand il lui survint un accident à la suite duquel il perdit une jambe. Pendant la guerre il s'adonna en grand à la fabrication des jambes artificielles, et ce n'est que depuis environ deux ans qu'il est revenu à l'aviation. Il fit alors l'acquisition des droits de construction du monoplane Koolhoven et en commença la fabrication à l'aérodrome de Croydon.

Le premier monoplane Desoutter, Marque I, avait un moteur "Cirrus," mais l'année dernière parut un second modèle, Marque II, muni du moteur inversé "Gipsy III," qui donne une meilleure visibilité du siège de pilotage. Les deux modèles sont des triplaces, les deux passagers étant assis côte à côte à l'arrière de l'habitacle, tandis que le pilote est à l'avant.

Les monoplans Desoutter se construisent principalement en bois, et même l'aile monoplane est recouverte de contreplaqué. Ces appareils sont très agréables à piloter, et la large voie du train d'atterrissage assure une bonne stabilité sur le sol.

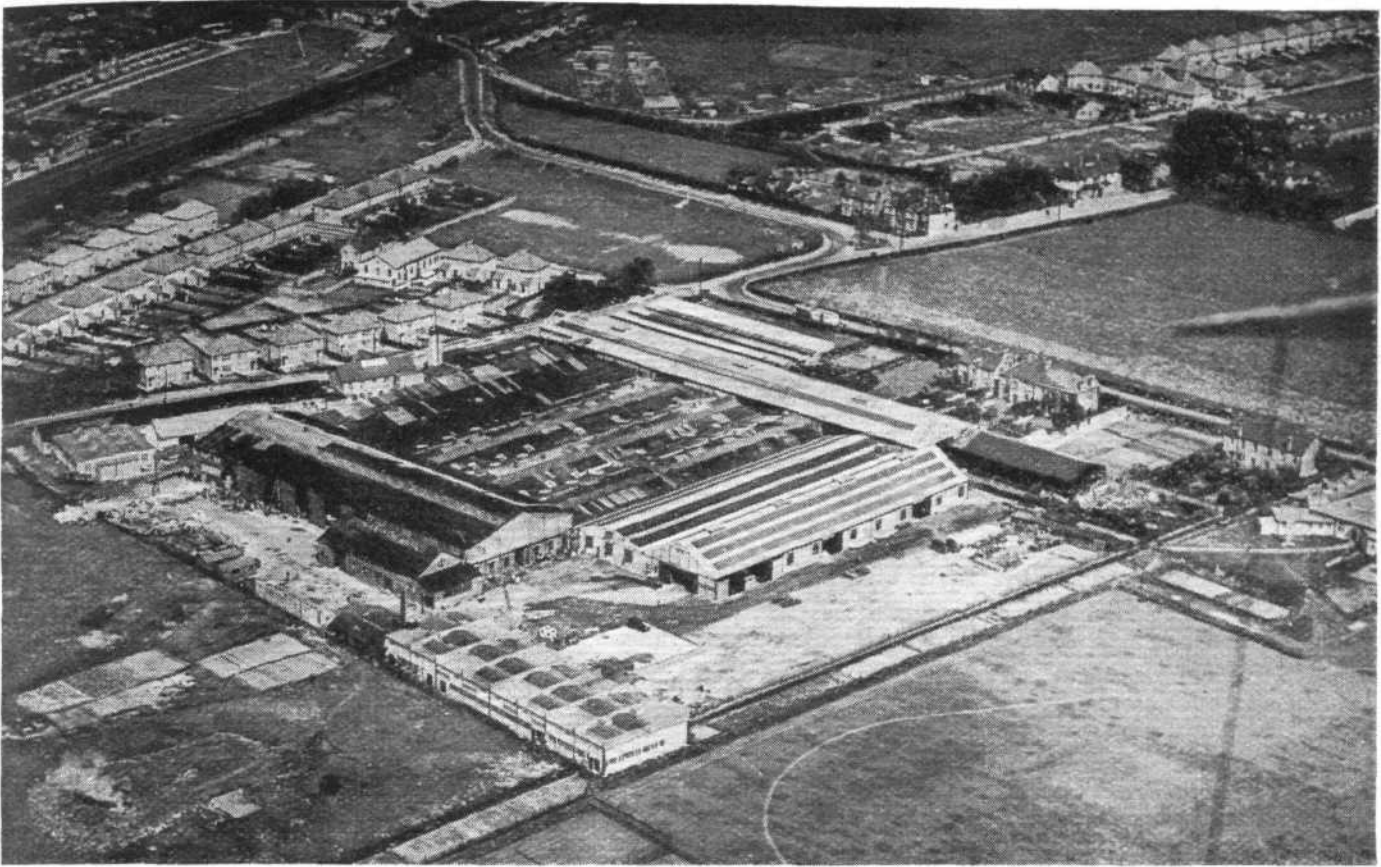
AUNQUE MARCEL DESOUTTER es de descendencia francesa, ha hecho toda su carrera aeronáutica en Inglaterra. Antes de la guerra era muy conocido en el aeródromo de Hendon como piloto de monoplanos Blériot, hasta que por causa de un accidente perdió una pierna. Durante la guerra se dedicó a la manufactura de piernas artificiales en grandes cantidades, y hasta hace pocos años no regresó a la aviación. Adquirió entonces los derechos de construcción de un monoplano Koolhoven y comenzó su manufactura en el aeródromo de Croydon.

El primer monoplano Desoutter, "Mark I," fué provisto de motores "Cirrus," pero el año pasado se produjo un segundo tipo, el "Mark II," en el cual se instaló un motor invertido "Gipsy III," que permite mejor vista desde el asiento del piloto. Ambos modelos son de tres asientos, y los dos pasajeros se sientan el uno al lado del otro en la parte posterior de la cabina, mientras que el piloto se coloca delante.

Los monoplanos Desoutter están contruidos principalmente de madera, pues aun el ala está cubierta con madera de tres dobleces. Las máquinas son muy cómodas y manejables, y la amplia distancia entre las ruedas produce gran estabilidad en el suelo.



Desoutter Monoplane Mark II. (Gipsy III engine.)
Monoplan Desoutter Marque II (moteur Gipsy III).
Monoplano Desoutter Mark II (Gipsy III engine).



Aerial view of Fairey works.
Vue aérienne des usines Fairey.
Vista aérea de los talleres Fairey.

FAIREY

THE FAIREY AVIATION COMPANY, LTD.,
HAYES, MIDDLESEX

C'EST pour ainsi dire depuis le début que Mr. C. R. Fairey fait partie de l'industrie de l'aviation anglaise, car, à l'époque des premiers vols, il participait déjà aux travaux de la Blair Atholl Company, dont les ateliers se consacraient alors à la construction des appareils Dunne autostables sans queue. Il fut ensuite collaborateur de la maison Short Brothers, Rochester, et finit par constituer la société qui porte son nom et dont il est encore administrateur délégué.

La Fairey Aviation Company se fit tout d'abord connaître par ses biplans Fairey III F, d'un emploi très répandu et le plus souvent montés en hydravions à flotteurs jumelés. Puis vinrent plusieurs autres types, dont l'un des descendants directs—célèbre aujourd'hui—est le III F. Mais il est probable que sur c'est le "Fox" que s'est fondé surtout le haut renom de la marque Fairey. Cet appareil sortait plutôt de l'ordinaire,

THE Fairey Aviation Company is one of the greatest producers of general purpose aircraft in Great Britain, the type which has placed the company in this position being the III F. To trace the direct ancestry of all modern types of Fairey aircraft, one should, perhaps, begin with the "Fox," which was a high-speed bomber produced some years ago as purely a private venture of the company, but which was quickly adopted, and from which more recent types were obviously developed.

Originally designed as a general purpose aircraft, the Fairey III F has many other applications, and has been used as a bomber and as an Army co-operation machine. In addition, it has been fitted with a variety of power plants, and has been used extensively and successfully as a seaplane, the two undercarriages being interchangeable. As a general purpose machine the Fairey III F is a two-seater, but the Fleet Air Arm type and Naval Reconnaissance types are three-seaters. Apart from its normal uses, the III F has been fitted with special catapulting points and can be launched by catapult. Thus, it will be seen, it is a very versatile machine indeed.

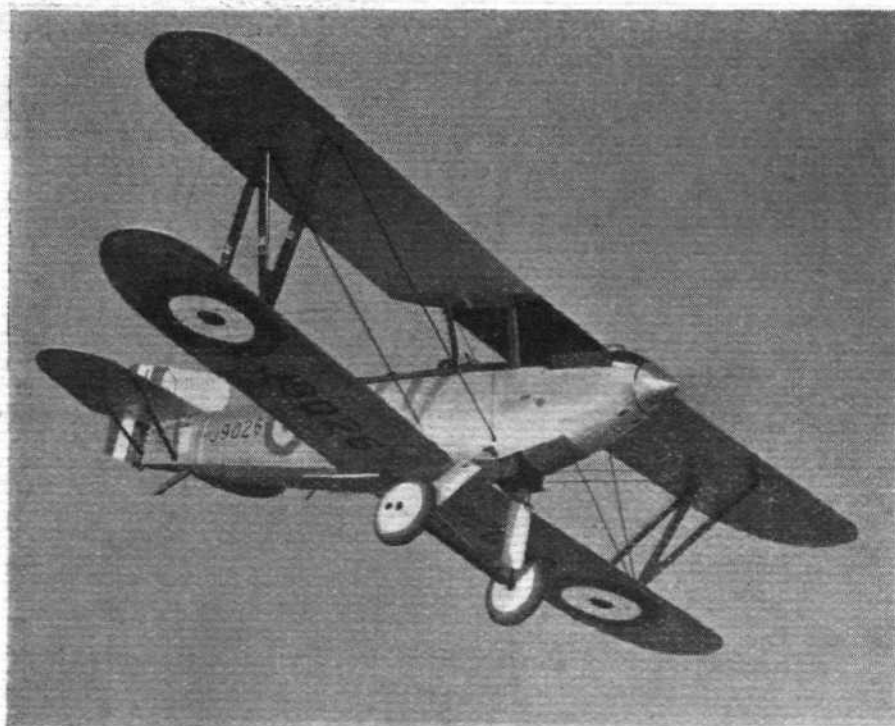
The construction of the Fairey III F is to a large extent typical of all recent Fairey machines, and includes a steel tube fuselage in which welded joints of a special type are used, while the main wing spars are solid drawn steel tubes of the section known as "double eight."

The armament of the III F consists of two machine guns, one fixed and provided with interrupter gear for firing through the propeller, and the other mounted either on a Scarff gun ring or on the special patented Fairey gun ring designed to meet the new needs arising out of increased performance. In addition to the machine guns, the III F is designed to carry a variety of bomb loads.

The Fairey "Firefly II M" is an interception fighter designed to have a very rapid climb and high speed and good manoeuvrability at heights. It is fitted with a Rolls-Royce supercharged "F" type engine, and is of extremely clean aerodynamic design, with frontal area reduced to a minimum. The upper wing is of larger chord than the lower, and the wings have a pronounced stagger so as to give the pilot the best possible view in all directions. Performance figures are not available, but the "Firefly II M" is claimed to be the fastest machine of its type in the world. It is believed



Fairey Fleetwing 2-seater fleet fighter.
Biplane naval de combat Fairey Fleetwing.
Avión naval de combate Fairey Fleetwing, de dos asientos.



Fairey Fox high-speed bomber.
Fairey Fox, avion de bombardement à grande vitesse.
Fairey Fox, avión rápido para bombardeo.

that the speed is more than 200 m.p.h., but how much more is not known.

Structurally, the "Firefly II M" is similar to the III F, except that the wing spars are of drawn steel strip construction.

The armament of the "Firefly II M" consists of two Vickers .303 synchronised guns placed on opposite sides of the fuselage and with their barrels in blast channels in the fuselage panel covering. The guns are not staggered in relation to each other, the unstaggered arrangement having been made possible by the use of a special form of ammunition box with twisted neck. The removal of the two cowling panels at the sides of the cockpit completely exposes both guns for inspection or removal. As the machine is intended to operate at great altitudes, an oxygen supply for the pilot is needed. This is carried in a standard 750-litre cylinder secured by straps inside the top fairing behind the pilot.

The "Firefly III M" also fitted with Rolls-Royce "F" engine, is a ship's fighter (single-seater) designed for Fleet Arm Air use. The machine will take either a land undercarriage or a twin-float undercarriage, and is, in addition, fitted up for catapult launching. The construction is all-metal, with steel tube fuselage, steel strip spars, and duralumin ribs. Independently controlled wheel brakes are fitted as standard. The armament consists of two belt-fed guns firing forward and provided with interrupter gear.

car il était construit de manière à ce que tous les accessoires, tels que mitrailleuses, leurs supports, etc., faisant ordinairement saillie à l'extérieur, se trouvassent logés à l'intérieur du fuselage. Cette disposition assurait donc à l'appareil un grand rendement aérodynamique, et l'on retrouve la trace du "Fox" non seulement dans les appareils Fairey plus récents, mais presque chez tous les avions de construction moderne.

Lorsqu'en Angleterre le Ministère de l'Air décida qu'à l'avenir tous les appareils destinés aux unités de combat seraient de construction entièrement métallique, les ingénieurs de la maison Fairey se mirent à l'oeuvre pour élaborer leur propre forme de construction, et ils décidèrent d'y employer d'une part des tubes en acier soudés et, d'autre part, des rubans en acier et en duralumin.

Le type III F, dont il s'est déjà construit un très grand nombre d'appareils, s'emploie non seulement dans les services de l'aviation britannique, mais encore en différentes parties du monde. C'est ainsi que le type III F s'est aménagé en avion de bombardement, en appareil pour applications générales, également en hydravion répondant à diverses utilisations et, muni au choix de différents groupes moto-propulseurs à refroidissement par l'eau ou par l'air, il a donné en vol d'excellents résultats.

Le Fairey "Firefly," Mark III M, est un monoplacé de combat pour navires de guerre, destiné à s'employer dans les services de la flotte. De même que tous les appareils Fairey, on peut dire qu'il a fait preuve d'une excellente performance, bien qu'il ne nous soit pas loisible de citer des chiffres. Moteur Rolls-Royce type F.XII. S.

Citons enfin le Fairey "Fleetwing," de dessin et de construction analogues dans ses grandes lignes, mais aménagé en biplace, à l'intention des services auxiliaires de la flotte, aussi bien pour le combat que pour les opérations de reconnaissance. Moteur Rolls-Royce F.XII. MS. De même que le "Firefly" le "Fleetwing" est de construction entièrement métallique, exception faite de l'entoilage.

MR. C. R. FAIREY ha estado relacionado con la aviación británica casi desde el principio, pues en los primeros días de la aeronáutica dicho caballero se hallaba con



Fairey III F, avec moteur Armstrong-Siddeley Panther.

Fairey III F with Armstrong-Siddeley Panther engine.

Fairey III F, con motor Armstrong-Siddeley Panther.

la compañía Blair Atholl, la cual construía las máquinas Dunne automáticamente estables, sin cola. Desde allí se fué a la sociedad Short Brothers, de Rochester, y por último formó la compañía que hoy lleva su nombre y de la cual es el administrador gerente.

La empresa Fairey Aviation Company llegó primeramente a ser bien conocida por el uso extenso de los biplanos Fairey III D, la mayor parte de los cuales eran hidroaviones de flotadores gemelos. Estos fueron seguidos por varios otros tipos de los cuales uno de los descendientes directos—célebre en la actualidad—es el modelo III F. Sin embargo, quizás fué el tipo "Fox" que constituyó la base fundamental de la gran importancia actual de la compañía Fairey. Dicho tipo se destacaba en algo de lo común puesto que había sido diseñado en tal forma que todos los accesorios salientes tales como ametralladoras, aros de montura de ametralladora, etc., se alojasen dentro del fuselaje. Esto dió por resultado que la máquina estuviese dotada de propiedades aerodinámicas muy elevadas, y no solamente se hallan trazas del tipo "Fox" en todos los aparatos Fairey que se idearon más tarde sino que también se hallan en casi todos los aparatos de aviación modernos.

Cuando el Ministerio Británico de Aviación dispuso que en lo futuro todos los aparatos de aviación empleados por los servicios belicosos del Estado fuesen de construcción enteramente metálica, los ingenieros de la compañía Fairey acometieron la tarea de desarrollar sus propias formas de construcción, la cual se lleva a cabo parcialmente con tubos de acero soldados y en parte con tiras de acero y de duraluminio.

El tipo III F. ha sido producido en grandes cantidades y se emplea no solamente en los servicios de Estado en la Gran Bretaña sino que también en algunos de los servicios de aviación en diversas partes del mundo. El aparato tipo III F. ha sido construido para los fines de lanza-bombas, como aparato de aviación para fines generales y como un hidroavión para fines diversos, mientras que ha sido dotado y maniobrado con éxito con motores de muchas marcas diferentes, tanto de enfriamiento por agua como de enfriamiento por aire.

El aparato Fairey "Firefly," Mark III M., es un monoplaza de combate ideado para



Fairey Firefly III M single-seater ship's fighter.
Fairey Firefly III M, monoplaza de combat pour unités navales.
Fairey Firefly III M, monoplaza de combate para navíos.

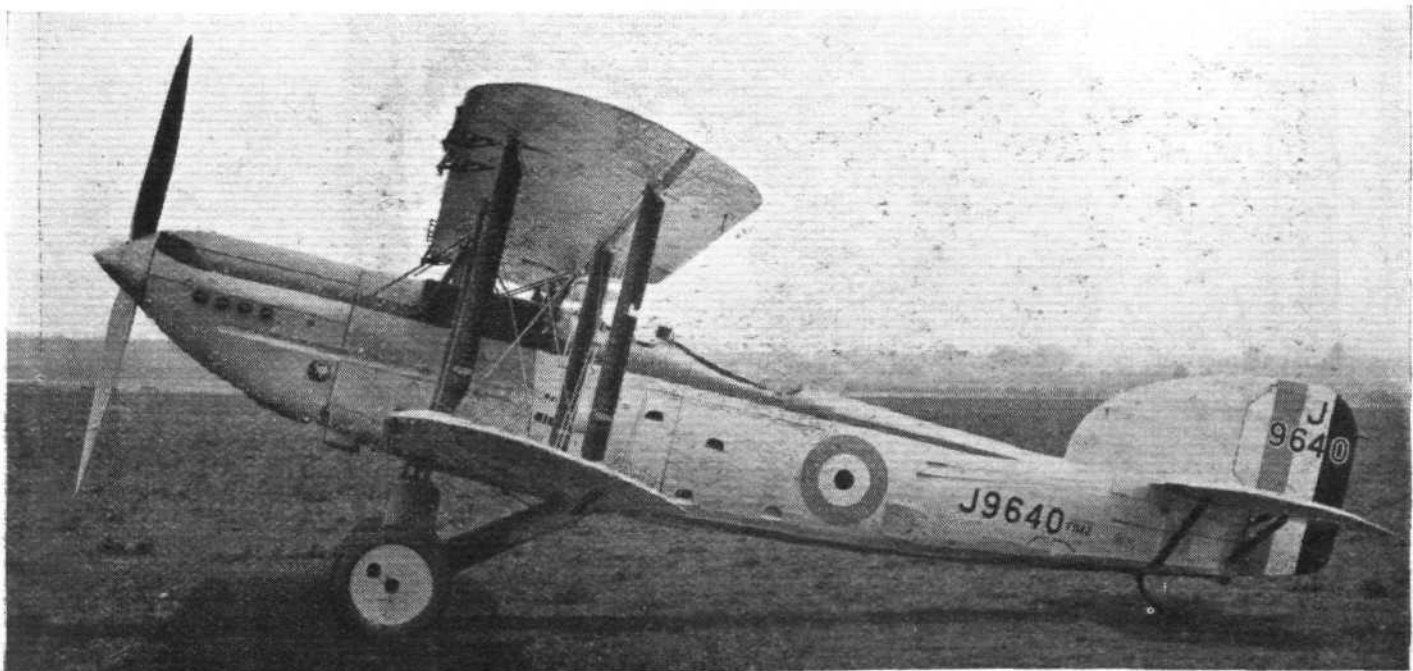
The Fairey "Fleetwing," Rolls-Royce F.XII M.S. engine, is an all-metal two-seater, and has been designed to fulfil the requirements for undertaking Fleet Air Arm duties of a fighter-reconnaissance aircraft. Like other aircraft it has a steel tube fuselage, high-tensile steel strip spars, and duralumin ribs. The wings are designed for folding, and full provision is made for catapult launching.

The armament consists of one belt-fed gun firing forward through interrupter gear, with a drum-fed gun on the special rear mounting, which is of the Fairey high-speed type. Four 20-lb. bombs can be carried. In addition to the general flying equipment, there is included radio, camera, electrical equipment, signal pistol, etc.

It may be recollected that not very long ago the Fairey Aviation Company designed and built a long-range monoplane which established a record by flying from England to Karachi non-stop. The machine later came to grief through flying into mountains in Africa during bad visibility. Otherwise there is little doubt that it would have beaten the world's record by flying from England to Cape Town without landing.

uso en el Servicio de Aviación Auxiliar de la Armada. Como sucede con todos los aparatos de aviación Fairey, está dotado de una *performance* muy excelente, a pesar de que no nos es posible hacer mención alguna de las cifras relativas. Este modelo está provisto de un motor Rolls-Royce tipo F.XII S.

El aparato Fairey "Fleetwing" es muy semejante en cuanto a su apariencia general y su construcción, pero es un modelo de dos plazas que ha sido ideado para prestar servicio auxiliar para la armada, tanto para los fines de combate como para los fines de reconocimientos aéreos. Está dotado de un motor Rolls-Royce F.XII MS.



Fairey III F, appareil de service général (moteur Napier Lion).

Fairey III F general purpose machine. (Napier Lion engine.)

Fairey III F, para servicio general (motor Napier Lion).

GLOSTER

THE GLOSTER AIRCRAFT CO., LTD.,

WORKS: HUCCLECOTE,
GLOS.

LONDON OFFICE: BYRON HOUSE,
ST. JAMES STREET, S.W.1

THE GLOSTER AIRCRAFT CO., LTD., is, perhaps, best known to foreign readers of FLIGHT from long and persistent participation in air races and contests, among which the contest for the Schneider Trophy. A number of machines have been built by the Gloster Company for this contest, and the company has probably longer experience of racing aircraft design than any other British aircraft firm.

From the founding of the firm in 1919 until this year, the headquarters of the Gloster Aircraft Co. were at Cheltenham, Gloucestershire, but some years ago Mr. Longden, the Managing Director of the firm, purchased from the Government the aerodrome and buildings at Hucclecote, between Cheltenham and Gloucester. A large number of hangars were already in existence on this aerodrome, and these have now been put into shape to receive the manufacturing plant of the company, which has gradually been transferred from Cheltenham. A few years ago the Gloster Aircraft Co. took over the Steel Wing Co., which had been designing and manufacturing metal wings since 1915, and in this manner, when the British Air Ministry announced that after a certain period all aircraft for military purposes must be of all-metal construction, the Gloster Aircraft Co. was in an excellent position to turn out metal aircraft. The plant at Hucclecote is one of the most up to date in the country, and some idea of the quantity of work undertaken may be formed from the fact that more than 300 sets of wings for the Westland "Wapiti" machines have been manufactured.

Apart from their Schneider Trophy machines, the Gloster Aircraft Co. has produced, during the last few years, a number of experimental types, many of them of the single-seater fighter class, to which class belongs the type S.S.18 illustrated herewith.

The Gloster S.S.18 is a single-seater fighter biplane, capable of reaching a great altitude in a very short time, and of maintaining a high speed and good manoeuvrability at that altitude. Either the Bristol "Jupiter" Series VII.F, or the Armstrong Siddeley "Jaguar Major" engine can be fitted. Some idea of the performance of the machine can be gained from the fact that at 3,000 metres the maximum speed is 322 km./h., while at 6,000 metres it is still 314 km./h. The climb to 6,000 metres occupies only 12½ minutes.

The fuselage of the S.S.18 is in three sections, of which the front portion forms the engine mounting, the middle section includes the cockpit, with fuel tanks, etc., while the rear portion carries the tail unit. The engine is mounted on an engine bearer comprising eight round steel tubes attached to the four longerons by socketed ends. The centre portion is of square tube, and joints are formed by simple plate fittings. The rear portion is of round tubing with joints of the standard Gloster pressed-plate type.

LA SOCIÉTÉ GLOSTER AIRCRAFT CO., LTD., s'est constituée peu de temps après la guerre et a toujours suivi une politique de participation énergique aux courses et concours de l'aviation. Les plus renommés de ses produits sont les avions marins Gloster, construits en vue des épreuves de la Coupe Schneider. La société possède aujourd'hui une très grande usine pour la construction d'appareils entièrement métalliques, et elle a déjà sorti un certain nombre de types divers, tant militaires que civils. Au nombre des premiers on peut citer le type S.S. 18 illustré ci-contre. Quant aux avions civils, celui qui a eu le plus de succès est l'appareil de topographie aérienne employé par l'Aircraft Operating Company pour l'étude topographique de vastes régions africaines. Cet appareil peut continuer à voler avec un de ses moteurs "Jupiter" hors d'action, condition indispensable pour un avion destiné à opérer dans une contrée où un atterrissage forcé ne pourrait s'effectuer sans courir de grands risques.

Outre la construction d'avions entièrement métalliques, la compagnie Gloster s'occupe aussi du développement de l'hélice à pas variable Hele-Shaw, dont le pas se règle automatiquement ainsi que peuvent l'exiger n'importe quelles conditions de vol données.

Le S.S. 18 est un avion de combat monoplace entièrement métallique, étudié pour réaliser une bonne performance aux altitudes élevées. Peut se munir soit du moteur Bristol "Jupiter," soit du moteur Armstrong Siddeley "Jaguar Major." A noter que les ailes sont renforcées par deux travées de chaque côté, ce qui leur assure une grande solidité et une rigidité parfaite.

Variable
pitch propeller
test house.

No. 3 hangar
(experimental
department).

No. 2
hangar.

Wind tunnel
and research.

No. 1
hangar.

Obsolescence
stores.



Aerial view of new Gloster works at Hucclecote, Glos.
Vue aérienne des nouvelles usines Gloster à Hucclecote, Glos.
Vista aérea de los nuevos talleres Gloster en Hucclecote, Glos.

THE GLOSTER AIRCRAFT CO., LTD.,

se formó poco después de la guerra y ha seguido siempre una política de participación enérgica en las carreras y los concursos. Los hidroplanos Gloster más conocidos son aquellos que se produjeron para competir en las carreras del Trofeo Schneider. La compañía tiene ahora una gran fábrica para la manufactura de máquinas enteramente de metal, habiendo construido diversos tipos, tanto para aviación militar como civil. Entre los primeros puede mencionarse el tipo S.S. 18 que aquí se ilustra; entre los segundos, uno de los que han alcanzado más éxito es el aeroplano para trabajos de topografía aérea que actualmente emplea la Aircraft Operating Company para el estudio topográfico de vastos territorios en Africa. La máquina puede volar con cualquiera de sus motores "Jupiter" parado, siendo ésta una condición esencial para un aeroplano que ha de volar sobre una región en que el aterrizaje forzoso ofrece ciertos peligros.

Además de sus aeroplanos enteramente de metal, la compañía Gloster se ocupa ahora del desarrollo de la hélice de metal "Hele-Shaw, de paso variable, que regula automáticamente su paso a lo que se requiera, cualesquiera que sean las condiciones del vuelo.

El S.S. 18 es un avión de combate, enteramente de metal y de un solo asiento, diseñado para asegurar una buena performance a grandes alturas. Puede proveerse de un motor Bristol "Jupiter" o de un Armstrong Siddeley "Jaguar Major." Obsérvese que las alas están arriostradas por dos entramados en cada lado para dar más fuerza y rigidez.



Gloster Air Survey machine (two Bristol Jupiters).
Appareil Gloster de topographie aérienne (deux moteurs Bristol Jupiter).
Avión Gloster para topografía aérea (dos motores Bristol Jupiter).

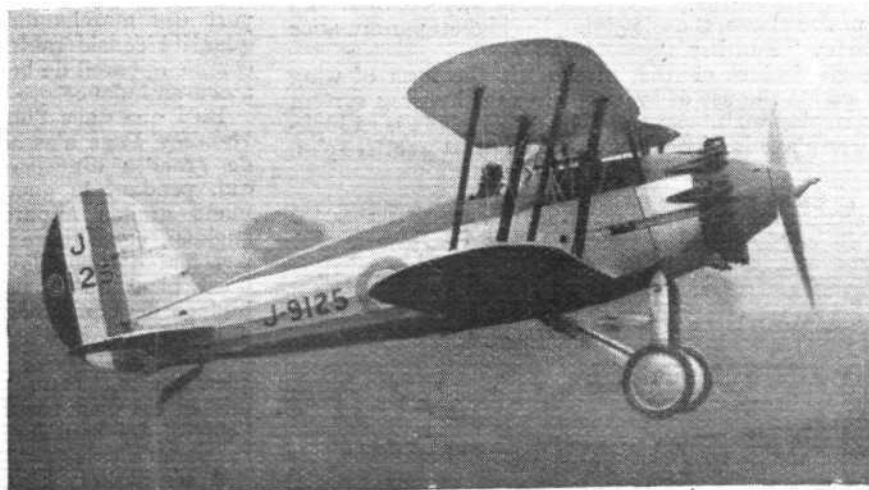
The wings have two main spars of high-tensile steel strips, and ribs also of steel strip. The wings are braced by two pairs of inter-plane struts on each side, so that the angle of the bracing wires is extremely good, the compression in the spars small, and the wing structure very stiff, not only in bending but also in torsion.

The undercarriage is of wide track, and springing is by rubber blocks in compression, bouncing being prevented by an oil dashpot. Wheel brakes are fitted, and can be operated either by pedals mounted on the rudder bar or from the control stick itself.

Of civilian machines manufactured recently by the Gloster Co., reference should be made to the Air Survey biplane, an all-metal machine designed especially for air survey work and fitted with two Bristol "Jupiter" engines. One of these machines is at present in use by the Aircraft Operating Co., on an important air survey in Africa.

The Gloster Air Survey machine, type A.S.31, is of all-metal construction, with a fuselage built of steel and duralumin, and biplane wings having a special type of lattice spars developed by the Gloster Aircraft Co. The wing ribs are of duralumin, and are built in three sections: leading edge, centre section and trailing portion. Bridge pieces on the spars serve for the attachment of the three rib portions, and with this form of assembly there is the advantage that if a rib is damaged, only the damaged portion need be renewed, which is a much easier operation than removing a complete rib from the wing and substituting a new one.

A feature of this Air Survey machine is that it is so liberally supplied with power that it is able to fly on either of its two engines. For the type of air survey work undertaken in Africa by the Aircraft Operating Co., forced landings cannot be tolerated, as most of the country being surveyed is of such a nature that a forced landing would be likely to have serious consequences. The fuselage is of generous dimensions, and probably never before in the history of aerial surveying has an aircraft provided such excellent accommodation for the photographer. This, of course, is a result of the fact that the machine has been specially designed for the work.



Monoplace de combat
Gloster SS. 18.

Gloster SS 18 single-seater fighter.

Monoplaza de combate
Gloster SS. 18.



HANDLEY PAGE

HANDLEY PAGE, LIMITED,
CRICKLEWOOD, LONDON, N.W.2

Handley Page 42,

THE name Handley Page has for very many years been associated in most people's mind with large aircraft of the bombing type, doubtless as a result of the large machines built by the Handley Page firm during the War. And although the firm has during recent years produced a number of aircraft of medium size, it is still the large machine which is the mainstay of the firm, whether of service or commercial type.

The "Hinaidi" is a twin-engined night bomber fitted with two "Jupiter VIII" engines. Other power plants can, however, be installed, such as the Napier "Lion" or the Rolls-Royce "F" type. The fuselage is built of steel tube struts, welded together, while the wings have main spars of duralumin and ribs of the same material. The armament consists of two guns, one mounted in the bows and the other on a Scarff gun ring aft of the wings. Provision is made for the rear gunner to be able to fire through the bottom of the fuselage, towards and under the tail. The bombs may be distributed under the fuselage and lower planes, and there are several alternative loadings at each of these stations. Camera and wireless are included in the equipment which can be carried.

The "Clive" is generally similar to the "Hinaidi," but is intended for troop transport. It could, however, also be converted very readily into a freight carrier, petrol carrier, bomber, and aerial ambulance. The standard power plant consists of two "Jupiter" engines mounted in the gap between the wings.

The "Hare" is a two-seater long-range reconnaissance day bomber, and can be fitted with various power plants, the one giving the highest performance being the Armstrong Siddeley "Panther."

Perhaps the most unusual feature of the "Hare" is the form of wing bracing employed, which avoids the use of bracing wires in the wing system and reduces or eliminates rigging maintenance. The upper plane is of high aspect ratio, while the lower plane is of the same chord but of smaller span.



Handley Page Clive Troop Carrier.
Handley Page Clive, avion pour le transport des troupes.
Handley Page Clive, avión para transporte de tropas.

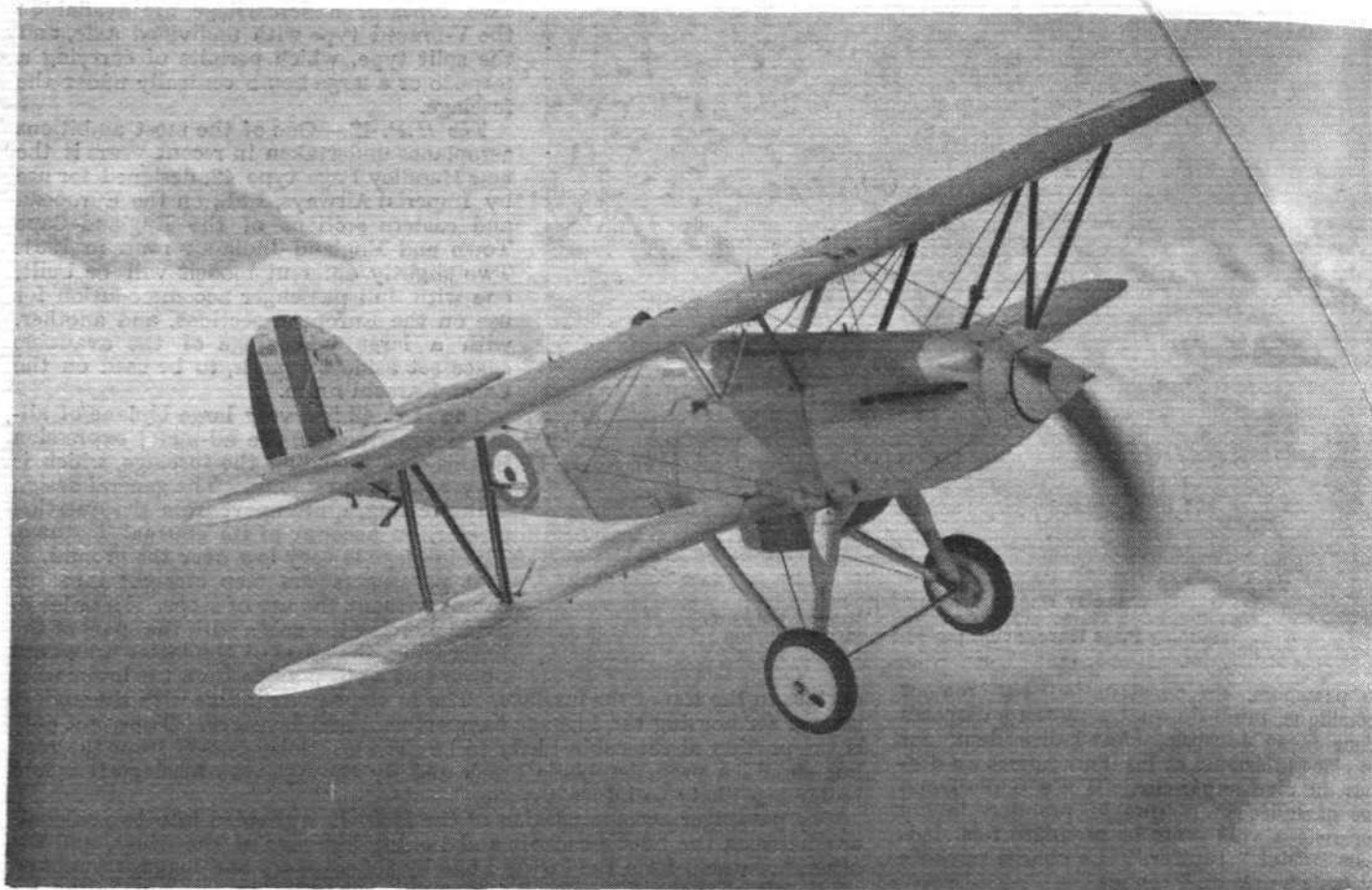
MR. HANDLEY PAGE a consacré sa vie à l'étude de la stabilité des avions. Ses premiers appareils, construits en 1909-1910, avaient été conçus afin de réaliser l'autostabilité, et voici quelques années déjà qu'il a inventé la fente automatique qui évite la chute en vrille lorsque l'appareil est en perte de vitesse.

Indépendamment d'une somme considérable de travail consacrée aux fentes pour ailes, la maison Handley Page a mis au point ces dernières années un grand nombre de types différents d'appareils d'aviation, dont les plus connus sont probablement les grands bombardiers de nuit de la classe "Hinaidi," munis de deux moteurs Bristol "Jupiter." Il s'est construit de nombreuses unités de ce type à l'intention de l'Aviation Royale de Grande Bretagne, et la maison vient tout dernièrement d'en recevoir une nouvelle commande importante.

Le Handley Page "Clive," de construction assez analogue à celle du type "Hinaidi," s'en différencie pourtant par ses aménagements intérieurs, établis pour le transport des troupes. Mais le "Clive" n'en est pas moins susceptible de s'utiliser soit au transport des marchandises, soit à celui d'une quantité considérable d'essence, soit encore comme appareil de bombardement ou comme avion-ambulance.

Bien que dans l'idée du public la maison Handley Page s'associe surtout aux avions de grandes dimensions (puisque c'est elle qui, pendant la guerre, construisait les premiers grands appareils de bombardement anglais), cette usine n'en a pas moins sorti pas mal d'appareils de moindre envergure. C'est ainsi qu'on peut citer le "Hare," biplace de bombardement diurne possédant un grand rayon d'action et muni d'un seul moteur Armstrong Siddeley "Panther." Bien que le "Hare" soit un biplan, la cellule en est disposée de manière à supprimer l'emploi des haubans, de sorte qu'en service l'appareil n'exige point de soins constants.

A ses ateliers de Cricklewood, la maison Handley Page vient dernièrement de terminer le premier de toute une série de très grands biplans, que l'Imperial Airways Ltd. destine à assurer le service de certains parcours que comportent les lignes aériennes de l'Empire Britannique. Il s'agit de l'appareil type HP 42, aménagé pour le transport d'environ



HAWKER

THE H. G. HAWKER ENGINEERING CO., LTD.,
CANBURY PARK ROAD, KINGSTON-ON-THAMES

THE H. G. Hawker Engineering Co., Ltd., was formed in 1921 from the nucleus of the old Sopwith Co., and have specialised in the design of military aircraft.

The first machine produced for the Royal Air Force, the "Woodcock" with a "Jupiter" engine, was immediately successful, and a similar type, the "Danecock" fitted with a "Jaguar" engine, was supplied as the standard fighter for the Royal Danish Naval Air Service.

When the R.A.F. were re-equipped with high-altitude day bombing squadrons, the firm produced the "Horsley" with Rolls-Royce "Condor IIIA" engine, which type was eventually selected and is still the standard machine for this class of work. It has been successfully adapted for coastal defence purposes, and with all-metal construction is now in use in Great Britain, the British Dominions, and by the Greek Naval Air Service. As a torpedo bomber the type has been extremely successful, and the torpedo of approximately 2,150 lb. (979 kg.) is the largest ever carried by a land machine. During the last naval manoeuvres excellent results were obtained with this weapon.

With the advent of metal aircraft a considerable amount of research and experimental work was carried out to ascertain the system and methods offering the greatest advantage, and the Hawker type is probably one of the most efficient yet. Simplicity throughout is the keynote of the construction, and in the choice of materials every endeavour has been made to select those which are universally available. Steel and/or duralumin tubing is the basic material of the fuselage design, and high-tensile steel strip for the wing spars. All connections are by means of flat plates and tubular rivets, and the ribs can be made from duralumin tube, channel, aluminium or timber, ease of attachment due to the spar shape being unaffected. That the Hawker type of construction has given complete satisfaction in service has been definitely established by the R.A.F. experience. That it results in a light, robust, and efficient structure is proved by the fact that in the latest series of competitive trials Hawker aircraft were the lightest in the respective classes, and apart from their outstanding performance, proved to be easy to maintain and inspect under all conditions.

Extensive trials carried out by the British Air Ministry have resulted in the selection of Hawker aircraft for R.A.F. re-equipment in several classes. The "Hart" machine with Rolls-Royce F.XI.B. engine is now in production for high-speed day bombing purposes. This machine is probably the most outstanding achievement of recent years. It has a performance superior to that of any single-seater fighter in production to-day, and its speed range and general layout is such that it can be utilised as a two-seater fighter, army co-operation, or general-purpose type. As a seaplane it shows to great

Hawker Fury single-seater fighter.
Monoplace de combat Hawker Fury.
Monoplaza de combate Hawker Fury.

LA SOCIÉTÉ H. G. HAWKER ENGINEERING CO. LTD. est une descendante de la célèbre compagnie Sopwith, et ses administrateurs délégués sont MM. Sopwith et F. Sigrist, deux vétérans distingués parmi les pilotes et constructeurs de l'aviation britannique. Voici plusieurs années que la firme Hawker se spécialise dans l'élaboration d'une forme très simple de construction métallique, extrêmement solide pour son poids, comme le montre le fait que les avions Hawker sont, généralement parlant, plus légers pour la charge qu'ils ont à porter que la majorité des autres avions.

Depuis ces deux ou trois dernières années, les avions Hawker qui se sont le plus distingués sont le "Hart" et le "Fury." Le "Hart" est un appareil de bombardement de jour doué d'une extrêmement bonne performance, réalisée en partie par l'excellence de la construction et en partie par un profilage étudié très soigneusement dans le but de mieux réduire encore la résistance à l'avancement. A part sa bonne performance, le "Hart" présente, comme l'ont constaté les escadrilles de l'Aviation Royale de Grande Bretagne qui en font usage, d'excellentes qualités de durabilité ainsi qu'une grande facilité d'entretien.

L'appareil Hawker "Fury" est un avion de combat monoplace du type dit "intercepteur," étudié spécialement afin de pouvoir gagner en fort peu de temps une altitude très élevée et y atteindre une grande vitesse. De même que le "Hart," le "Fury" est équipé du moteur Rolls-Royce type F, mais celui du "Fury" est à suralimentation afin de pouvoir maintenir sa puissance aux altitudes auxquelles l'appareil doit normalement opérer.

La Compagnie Hawker produit aussi un petit appareil d'entraînement tout en métal, le "Tomtit," actionné par un moteur Armstrong-Siddeley.

THE H. G. HAWKER CO. LTD. es descendiente de la famosa compañía Sopwith. Mr. Sopwith, piloto, constructor y uno de los primeros que se dedicaron a la aviación en la Gran Bretaña, es director gerente de la compañía, en unión de Mr. F. Sigrist, que es también uno de los más antiguos en este ramo de la industria. La empresa Hawker se ha dedicado especialmente en los últimos años a la producción de una forma muy sencilla de construcción metálica que es, a la vez, muy fuerte para su peso, como lo demuestra el hecho de que los aeroplanos Hawker son, en general, más ligeros que otros aviones en relación con la carga que han de llevar.

Durante los dos o tres últimos años, los aparatos Hawker que más fama han conquistado son el "Hart" y el "Fury." El primero es un avión para bombardeo diurno, cuya performance es sumamente buena, debido en parte a su excelente construcción y también a la perfección de sus perfiles especialmente estudiados para reducir la resistencia. Aparte de su magnífica performance, los Escuadrones del Cuerpo de Aviación que lo usan han hallado que el "Hart" posee muy buenas cualidades de duración y facilidad de entretenimiento, pues requiere muy poca atención mientras presta servicio.

El "Fury" de la Compañía Hawker es un aeroplano de combate, de un solo asiento, del tipo que se conoce como "combatiente interceptor," debido al hecho de que ha sido diseñado para poder alcanzar gran altura en muy poco tiempo y para volar con suma rapidez a tal altitud. Lo mismo que el "Hart," el "Fury" está provisto de un motor Rolls-Royce tipo "F," pero el motor del "Fury" tiene alimentación forzada con el fin de que mantenga su fuerza a la altura a que esta máquina ha de volar normalmente.

La Compañía Hawker produce también el "Tomtit," un pequeño aeroplano para instrucción, enteramente de metal, que lleva un motor Armstrong-Siddeley. Esta máquina está equipada para instruir en el vuelo "a ciegas," y con este fin se coloca por encima del discípulo una capucha que le obliga a volar dependiendo enteramente de sus instrumentos, pues no le es posible ver el suelo.



Hawker Tomtit training machine.
Appareil d'entraînement Hawker Tomtit.
Hawker Tomtit, avión para instrucción.

advantage, and is likely to be utilised for the re-equipment of the Fleet Air Arm.

The "Fury" Interceptor fighter with Rolls-Royce F.S. engine has also been selected as the standard interceptor fighter. This machine embodies the same constructional features and outstanding performance as characterises the "Hart." It possesses a remarkable degree of manoeuvrability, and is undoubtedly one of the finest fighting aeroplanes in the world.

A further competitive success has just been achieved by an adaption of the "Fury"—also with the F.S. engine—for Fleet Air arm work. It is suitable for operating from a carrier or battleship.

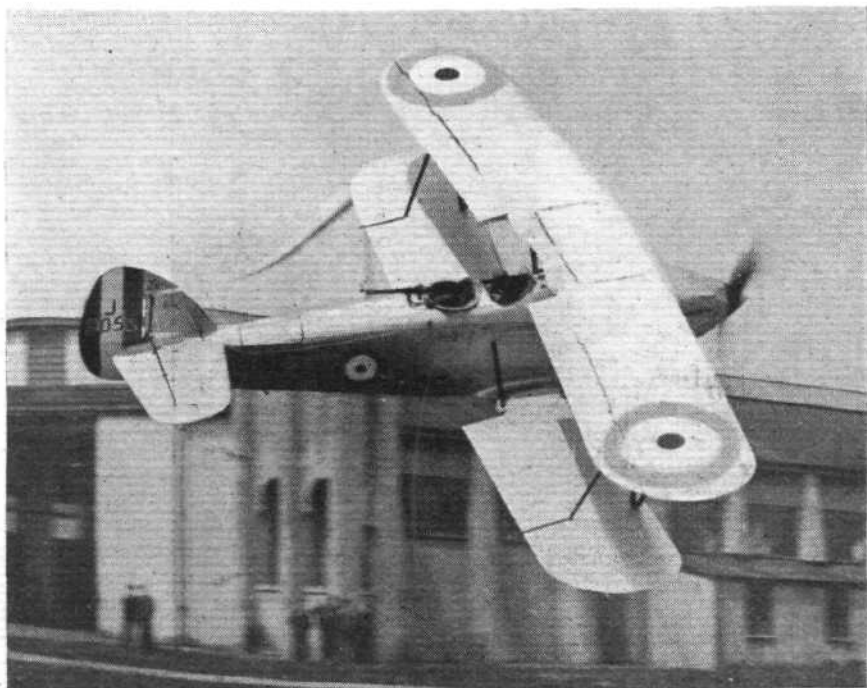
The selection of these types will result in the R.A.F. equipment being superior to that of any other air force in the world, and forms a striking tribute to the qualities of Hawker design and construction.

Some years ago the Hawker company produced a two-seater training machine, known as the Hawker "Tomtit." The original machine was fitted with the Armstrong Siddeley "Mongoose" engine, but more recently the "Cirrus-Hermes" has been fitted experimentally. With either engine the machine has a good performance, and apart from its use as a training type, it would form a very useful machine for the private owner.

The "Tomtit" is of usual Hawker construction, with a steel-tube fuselage incorporating the well-known and extremely simple Hawker-type bolted joints. The wings have steel spars and duralumin ribs. The spars are solid-drawn steel tubes formed into the section known as the "double eight."

The "Tomtit," in addition to the normal equipment used in school machines, is fitted up for teaching "blind" flying. Over the rear cockpit a special form of collapsible hood is fitted. The pupil occupies the aft seat, and when the desired altitude has been reached the hood is closed and the pupil, on taking control of the machine, must perforce rely entirely on his instruments, as he cannot see beyond his cockpit. To assist the pupil in keeping his course, the cockpit is provided, in addition to the usual instruments, with a Reid-Sigrist turn indicator, which at once shows the pupil not only that

he is deviating from his course, but also in which direction, i.e., left or right. It is, of course, well known that the compass by itself is not sufficient to enable a pilot to keep a course when he is flying in clouds or fog, as a few turns first to one side and then to the other soon set the compass swinging, until the pilot is at a loss to know exactly what his machine is doing. When he can see the ground he has a datum line to judge by, and can correct his turns, but out of sight of the ground some instrument such as the Reid turn indicator is required. In the "Tomtit" a special floodlight system of dashboard illumination has been installed for use when the pupil's cockpit is covered by the hood.



Hawker Hart high-speed day bomber.
Hawker Hart, avión de bombardeo de jour à grande vitesse.
Hawker Hart, avión rápido para bombardeo diurno.

HENDY

THE HENDY AIRCRAFT CO., LTD.
SHOREHAM-BY-THE-SEA, SUSSEX

DESIGNED by Mr. Basil B. Henderson, the "Hendy 302" is a low-wing cantilever monoplane cabin machine intended for the private owner. The machine incorporates in its wing construction some unusual and patented features of which Mr. Henderson is the inventor. It is well known that with cantilever wings it is more difficult to provide torsional stiffness than adequate strength in bending, and the Henderson system of wing construction, here carried out in wood but easily adapted to metal construction, is designed to give great torsional stiffness. Fundamentally, the system consists in duplicating the internal drag bracing of the wing and placing one set of bracing on the upper faces of the spars and one on the lower. The bracing itself consists, in the "302," of crosses or "X" members of wood, attached by three-ply gussets to the top and bottom faces of the spars. Thus the spars and duplicate bracing crosses form a sort of box which is very rigid in torsion, and experience with two machines has shown that the Henderson system of wing construction is not only strong but also reasonably light.

The "Hendy 302" is a monoplane of very clean lines. The first machine was rushed through in time for the King's Cup Race, and although bad course-keeping prevented the machine from showing what it could do, the speed over one stage of the course was such as to demonstrate that the "302" is very fast, the maximum being a little over 130 m.p.h. Cruising at 1,900 r.p.m., the machine flies at 112 m.p.h.

Structurally, the "Hendy 302" is mainly of wood construction, this being simple, light and cheap when machines are being built in fairly small quantities. Mr. Henderson and Captain Percival are now arranging for the machine to be built in considerable numbers, and if later it should be found advisable to produce a metal version there is no great difficulty in doing so.

The cabin of the machine is roomy and well lighted by large windows in the sides and roof, and the view, particularly from the front cockpit is good, much better than one would expect. The front seat is far enough forward to enable the pilot to look over the leading edge, and the taper of the wings is such that towards the tips they obstruct the lateral downward view to a surprisingly small extent. The cabin top could, if desired, be removed and the machine used as an open tourer, but the absence of draught and noise which the cabin top affords makes it unlikely that anyone would, after trying the machine, wish to do away with the cabin.

The engine of the "302" is a "Cirrus-Hermes II," completely cowled in. The smooth and narrow top of the cowling obstructs the view but little, but if a purchaser should so desire there should be no difficulty in fitting an inverted engine, either the "Hermes" or the "Gipsy III." The petrol tanks are placed in the wing, and fuel is supplied to the engine by pump.

LE "HENDY 302" a été étudié et mis au point par M. Basil B. Henderson comme appareil rapide biplace de tourisme. Il est équipé d'un moteur "Cirrus-Hermes." C'est un monoplane conduite intérieure à aile surbaissée, dont la plus grande partie est en bois. Le longeron d'aile est d'un type tout particulier breveté par M. Henderson, qui donne une structure d'aile très résistante à la torsion, de sorte que le battement d'aile est presque impossible avec cette construction. Le toit de la cabine est monté à charnière d'un côté et peut s'enlever complètement au besoin : l'appareil devient alors un biplace ordinaire à poste découvert.

Malgré que la cabine soit fermée, les vues du siège du pilote (siège avant) sont excellentes. Cet avion est très rapide.

EL "HENDY 302" ha sido diseñado por Mr. Basil B. Henderson como aeroplano rápido de dos asientos para el turismo. Tiene instalado un motor "Cirrus-Hermes" y es un monoplane de cabina, de ala baja, construido principalmente de madera. El larguero del ala es de un tipo excepcional, patentado por Mr. Henderson, y da una estructura de ala que es muy rígida en la torsión, de modo que con esta construcción la sacudida del ala es casi imposible. El techo de la cabina está engoznado a lo largo de uno de los lados, pudiendo omitirse totalmente cuando así se desee, en cuyo caso queda una máquina ordinaria de dos asientos.

A pesar de que la cabina es cerrada, la vista desde el asiento del piloto (el asiento del frente) es muy buena; la máquina es sumamente rápida.



Hendy 302 2-seater light aeroplane. (Cirrus Hermes engine.)
Biplace léger Hendy 302 (moteur Cirrus Hermes).
Aeroplano ligero Hendy 302, de dos asientos (motor Cirrus Hermes).

LA "MONO-SPAR CO. LTD." a été fondée dans le but de développer et de mettre en exploitation un type de construction d'ailes inventé par M. Stieger, un jeune ingénieur suisse. Le principe Stieger comporte un longeron principal unique, suffisamment puissant pour résister, à lui seul, aux efforts de flexion purs et simples, mais entretenu au moyen de deux systèmes de fil métallique formant des spirales à sens opposé, qui stabilisent la structure de l'aile, et tiennent tête aux efforts de torsion. Telle est l'essence de ce principe, dont la mise à exécution peut, cependant, s'effectuer suivant une variété de procédés. Les avantages revendiqués pour ce type de construction d'aile à longeron unique sont qu'elle est beaucoup plus légère que le type à deux ou à plusieurs longerons. Il vient d'être mis la dernière main à une nouvelle machine à laquelle a été appliqué le principe du longeron unique, et les premiers essais de vol effectués ont remporté plein succès.

LA Compañía Mono-Spar Ltd. fué constituida para desarrollar y explotar un tipo de ala inventada por un joven ingeniero suizo, Sr. Stieger. El principio Stieger comprende un larguero principal único, suficientemente fuerte en sí para resistir los esfuerzos de flexión puramente, pero arriostrado por dos sistemas de alambre formando espirales opuestas, que estabilizan la estructura de la ala y resisten los esfuerzos de torsión. Este es el principio en breve, pero los detalles pueden ejecutarse de varias maneras. Se alega en favor de la ala construida con un solo larguero que es mucho más ligera que las con dos o varios largueros. Acaba de terminarse un aparato con alas construidas según el principio del larguero único y los primeros ensayos de vuelo han dado buenos resultados.

NAVARRO

NAVARRO SAFETY AIRCRAFT, LIMITED.

HESTON AIR PARK, HOUNSLOW, MIDDLESEX

A VERY unorthodox machine is the little Navarro "Chief" three-engined monoplane which is now nearing completion at the Heston works of Navarro Safety Aircraft, Ltd. Mr. Joseph Navarro has original ideas on the subjects of stalling and spinning, and in the design of the "Chief" he has attempted to solve, in his own way, the problems of safe flying. Whether he will succeed time alone can show, as the first machine incorporating the new features is not yet quite finished.

Briefly, Mr. Navarro's safety devices comprise up-turned wing tips for lateral stability, and elevators whose hinge line is not at right angles to the line of flight. Mr. Navarro's theory is that when the machine is on the point of spinning, the fact that one elevator flap is "broadside on" to the direction of motion while the other is almost "end on" will prevent the spin from developing. As the stall and spin are the most prolific causes of accidents, their prevention is well worth striving for, but it is a little difficult to see on what grounds, aerodynamically, the sloped elevator hinges can seriously affect the forces acting on the main wing.

The Navarro "Chief" is a high-wing monoplane with strut-bracing and fitted with three A.B.C. "Scorpion" engines, one in the nose of the fuselage and the other two outboard under the wing. The fuselage is of wood construction with plywood covering, and the three occupants, pilot and two passengers, sit one behind the other, the pilot in front. The "Chief" will probably be the smallest three-engined machine ever produced, and apart from the special safety features, it will be interesting to see how so small a machine compares with the single-engined type of the same power. The calculated top speed is 110 m.p.h. As the gross weight is 1,600 lb., and the total maximum power approximately 110 b.h.p., this top speed will probably be attained. It is calculated that the machine should, with full load, be able to maintain its height with either one of the three engines stopped.

MONOSPAR

THE MONOSPAR CO., LTD.,

BYRON HOUSE, ST. JAMES'S STREET, LONDON, S.W.1

WHEN it is pointed out that among the claims made for the mono-spar construction (Stieger type) is that of a saving in weight so great that with this form of construction a full cantilever monoplane wing comes out lighter than the corresponding biplane structure, it will be realised that if the claims are proved (and there is little cause to doubt that they will be) the system is likely to have very considerable influence on future aircraft design.

The Stieger mono-spar system of wing construction is based fundamentally on a single spar, of almost any desired construction, so built as to be strong enough to resist ordinary bending loads, but requiring some form of internal bracing to stabilise it and give it the necessary torsional stiffness. This is achieved by a system of wire, tie rod or strut bracing comprising an upper and a lower system, both crossing over the spar flanges and meeting near leading and trailing edges either on specially strong ribs or on special pyramids of metal tubes. The wire or tie rod bracing forms, in effect, two spirals of tension members wound around the wing in opposite directions.

Apart from the advantage in weight claimed for the mono-spar type of construction, it has another very important one in that, owing to the simplicity of the structure, and the manner in which its few members are disposed, it is possible to calculate accurately and with a great degree of certainty the actual stresses set up under any given condition of loading. Apart from the peace of mind with which this knowledge endows the aircraft designer, the fact of the structure being calculable results indirectly in a saving in weight because where the loads cannot be accurately calculated, it is customary to cover the deficiency by allowing fairly high "factors of ignorance."

Yet a further advantage of the Stieger mono-spar type of wing is that, as it consists of few and very robust parts, manufacturing costs under quantity production conditions should be relatively low.

Quite recently an experimental machine was completed and flight tested in which the mono-spar construction is employed. This machine is of a purely experimental nature, built mainly in order to try out the system, but the preliminary test flights indicate that the wing construction fulfils all that was expected of it. The fuselage of this experimental machine is as unorthodox in construction as is the wing, and incorporates somewhat similar principles, although as the loads on a fuselage structure are different, the details of the construction naturally differ from those of the wing. A large mono-spar wing to be fitted on a three-engined monoplane is now being built, and the results of tests should be extremely interesting.

LE "CHIEF" NAVARRO est un petit monoplan à trois moteurs, construit principalement en bois, et muni de trois moteurs "Scorpion" A.B.C. de 40 H.P. chacun. Monsieur Navarro se fait fort, grâce aux nombreux nouveaux perfectionnements apportés à la construction de cette machine, d'avoir éliminé tout risque de perte de pouvoir de sustentation et de descentes en vrille, de même que d'atterrissage forcé par suite de panne de moteur, cet avion étant capable de rester en vol malgré l'arrêt d'un de ses trois moteurs. Le "Chief" peut transporter trois personnes, le pilote et deux passagers, assis l'un derrière l'autre.

EL "CHIEF" DE LA CASA NAVARRO es un monoplano pequeño trimotor, construido principalmente de madera y dotado de tres motores "Scorpion" A.B.C., de 40 cab. cada uno. Este aparato reúne muchas originalidades, y el Sr. Navarro sostiene que en su construcción ha eliminado los riesgos de pérdida de velocidad en vuelo y de barrenas, así como las tomas de tierra forzadas a causa de fallas del motor, pues el aparato puede volar con uno de los tres motores parado. El "Chief" es de tres asientos, sentándose el piloto y dos pasajeros uno detrás del otro.

PARNALL

GEORGE PARNALL & CO.,
YATE AERODROME, GLOUCESTERSHIRE

A SERIES of interesting light aeroplanes have been produced during the last few years by George Parnall & Co., of Bristol, whose aircraft works are now at Yate aerodrome, Gloucestershire. This series began with the "Pixie" class, of which several were produced, both single seaters and two-seaters. More recently was produced the "Imp," a small two-seater, which was afterwards used as a flying test bench for the Pobjoy engine in the days when Mr. Parnall was developing that engine. Then, last year, followed the "Elf," a two-seater light aeroplane with "Cirrus-Hermes" engine. All these machines were designed by Mr. Harold Bolas, who has now left the firm and gone to the United States. The "Elf" was the last machine designed by Mr. Bolas before he left.

The Parnall "Elf," although being in the normal British two-seater light plane class, has several unorthodox features in its design. To begin with, the wings are heavily staggered and placed rather far forward on the fuselage. This has been done in order to bring both seats, passenger's as well as pilot's, behind the wings, so that in an emergency the passenger has the same chance to escape in his parachute as has the pilot. With the occupants both placed behind the wings, the centre of gravity would be too far aft, and to overcome this the wings are given a pronounced sweep-back. This sweep-back was also a characteristic feature of the "Imp," but in that machine it was only the top plane that was swept back, whereas in the "Elf" both wings are swept back.

The "Elf" is of all-wood construction, the fuselage being three-ply planked on light spruce and ash members, while the wings have I-section spars and wooden ribs. The wing bracing is unusual in that instead of the more usual vertical interplace struts and streamline wire bracing, the wings are entirely strut braced, the struts and wing spars forming a Warren girder.

The two cockpits, placed one behind the other in the usual way, are very roomy, and as the top plane is set low over the fuselage and the cockpits are behind the wings, the view from both seats is good.

The power plant of the "Elf" is a "Cirrus-Hermes" engine, mounted on a welded steel tube structure, the mounting being a detachable unit secured by four bolts to the fuselage proper, from which it is separated by a fireproof bulkhead. The main petrol supply is carried in a tank in the fuselage, and a pump raises it to a small gravity tank in the top centre section, whence it flows to the engine by gravity. With a maximum speed of about 116 m.p.h. and a cruising speed of over 100 m.p.h., the "Elf" is a very useful machine for private owners and flying clubs and schools.

George Parnall has also produced many interesting service types of aircraft. Of these, we have space to refer here to one only: the little "Peto," which is a two-seater reconnaissance biplane designed for service in conjunction with submarines. The machine has been fitted both with the Bristol "Lucifer" and the Armstrong-Siddeley "Mongoose" engines.

L' "ELF" PARNALL est un aéroplane léger à deux places, muni d'un moteur "Cirrus-Hermes." Il est principalement en bois, mais de construction plutôt inusitée à d'autres points de vue, tels que l'agencement de ses ailes. L' "Elf" est, en effet, un biplan à ailes cambrées vers l'arrière sous un angle assez considérable. Le but de ce dispositif est de permettre de placer les deux sièges, tant du pilote que du passager, derrière les ailes, et de fournir, par conséquent, aux occupants, le moyen de faire usage de leurs parachutes en cas de besoin.

Le haubanage constitue également une innovation en ce que les montants de liaison entrent la structure en triangle, de manière à rendre superflu tout ajustage en service.

Les Établissements Parnall ont encore construit plusieurs types militaires d'avions, de même que certains petits biplans intéressants étudiés pour transport à bord de sous-marins et coopération aux expéditions de ces bâtiments. Ces machines sont connues sous le nom de "Peto."

EL "ELF" DE LA CASA PARNALL es un aeroplano ligero de dos asientos, con motor Cirrus-Hermes. Está construido en su mayor parte de madera, pero en otros respectos se aparta algo de lo corriente, principalmente en lo que se refiere a la disposición de las alas. El "Elf" es un biplano con las alas inclinadas hacia atrás a un ángulo algo grande. Esto se ha hecho para que sea posible colocar los dos asientos de tal manera que tanto el pasajero como el piloto estén *detrás* de las alas y, por lo tanto, en estado de usar sus paracaídas en caso de necesidad.

El arriostrado de las alas es original, en que es del tipo rígido, siendo que los tirantes triangulan la estructura. Así, en el servicio no se necesitan ajustes.

La casa Parnall también ha construido varios tipos de aviones militares, y algunos biplanos pequeños interesantes, destinados a alojarse en submarinos y arrancar de ellos. Este tipo es conocido con el nombre de "Peto."



Biplane léger Parnall Elf (moteur Cirrus Hermes).

Parnall Elf 2-seater light aeroplane. (Cirrus Hermes engine.)

Aeroplano ligero Parnall Elf, de dos asientos (motor Cirrus Hermes).

ROBINSON

ROBINSON AIRCRAFT CO., LTD.,
STAFFORD ROAD, CROYDON, SURREY

C'EST dans le courant de l'été 1930 que la Robinson Aircraft Co., Ltd., l'une des plus jeunes entreprises de l'aviation anglaise, a réalisé son premier biplace léger muni du moteur A.B.C. "Hornet," appareil en bois comportant deux sièges placés côte à côte. Puis, plus récemment, cette usine a sorti une variante perfectionnée, actionnée au moyen d'un moteur Armstrong-Siddeley "Genet." En général ce nouvel appareil est analogue à son prototype, mais il comporte différentes améliorations de détail. Le fuselage est recouvert de contre-placage, tandis que les ailes du type biplan sont principalement en bois, exception faite des mâts et de leurs garnitures. Les ailes pliantes facilitent l'entrée de l'appareil au garage. Enfin, on a conservé la disposition des sièges côte à côte, et il paraît que l'appareil est d'une manœuvre très facile pendant le vol.

LA CASA ROBINSON AIRCRAFT CO., LTD., constituye una de las adiciones más recientes a la industria británica de aviones. Durante el verano de 1930 la firma construyó un aeroplano ligero de dos plazas provisto de un motor "Hornet" de A.B.C. Este aparato era de construcción de madera y los asientos estaban dispuestos uno al lado del otro. Más tarde se ha producido un modelo perfeccionado, el cual está dotado de un motor "Genet" de Armstrong-Siddeley. En cuanto a su construcción general este aparato se asemeja mucho al tipo para experimentos, pero se han incorporado mejoras en los detalles. El fuselaje es del tipo cubierto de madera terciada triple, mientras que las alas del biplano también están hechas principalmente de madera, excepción hecha de los montantes de refuerzo y sus herrajes. Las alas son del tipo plegable hacia atrás para los fines de alojar la máquina en un garaje. Se ha conservado la disposición de los asientos, uno al lado del otro, y se dice que el aparato de aviación es de fácil maniobra en el aire.

THE Robinson Aircraft Co., Ltd., is one of the latest additions to the British aircraft industry. The firm made its debut during the summer of 1930 with a little side-by-side two-seater called the "Redwing." Designed by Mr. John Kenworthy, this machine is a light aeroplane fitted with A.B.C. "Hornet" engine. At the time that machine was being constructed Mr. Robinson was still on the staff of Imperial Airways, Ltd., but he has now resigned from that firm to devote all his energies to the production of light aeroplanes, and the "Redwing" has now been put into production.

The production model, the "Redwing Mark II," resembles the experimental machine in general, but several detail alterations and improvements suggested by the first machine have been made, and the Armstrong-Siddeley "Genet" engine has been standardised for the production model.

The "Redwing" is a slightly staggered biplane of very pleasing appearance and without that look of "fatness" which one would expect from a machine with side-by-side seating.

The fuselage is of the box type, with a light framework covered with plywood. The internal framework includes straight and diagonal struts, so that the plywood covering is not relied upon exclusively for the bracing of the structure. An unusual feature is that the bottom of the fuselage, from the cockpit to the tail, is fabric covered. Thus, when a thorough inspection of the fuselage structure is required it is only necessary to strip the fabric off the bottom when the whole structure can be carefully examined. The whole machine is full of ingenious ideas of this sort, and bears testimony to the long experience of its designer, Mr. Kenworthy, who designed the first British light aeroplane, the Austin "Whippet," exhibited at the Olympia aero show in 1920.

The side-by-side seats are placed one on each side of a triangular structure which supports the centrally hinged undercarriage members, such as axles and radius rods, which are hinged to the centre line of the floor of the fuselage. The lower wings are attached to steel tubes running across the fuselage, and the tubes are carried by flat plates bolted to the lower longerons, large washers being used to give bearing areas in the wood of the longerons.

The wings have box spars and are fabric covered. The folding is neatly arranged, and external cranks automatically centre the ailerons when the wings are folded, and no slacking off of the control cables takes place.

Although the main petrol tank is housed in the fuselage there is enough "head" to give direct feed to the Armstrong-Siddeley "Genet" engine. The absence of a fuel tank in the top centre section adds to the clean appearance of the machine.



Robinson Redwing side-by-side 2-seater light aeroplane (Armstrong-Siddeley Genet engine).
Avion léger Robinson Redwing à deux places côte à côte (moteur Armstrong-Siddeley Genet).
Aeroplano ligero Robinson Redwing, de dos asientos dispuestos uno al lado del otro (motor Armstrong-Siddeley Genet).



A. V. ROE

WORKS: NEWTON HEATH,
MANCHESTER

LONDON OFFICE: 166, PICCADILLY,
W.1

Avro Five, small commercial aeroplane.
Petit avion commercial Avro Five.
Avro Five, aeroplano comercial pequeno.

AS already mentioned, the firm A. V. Roe & Co., Ltd., became one of the group of firms controlled by the Armstrong-Siddeley Development Co. some years ago. The old firm, has, however, retained its independence in the matter of design, and a large number of types has been produced since the amalgamation. Mr. Roy Chadwick, who has been associated with Sir Alliott V. Roe since the earliest days, is still chief designer, although Sir Alliott himself is no longer connected with the firm which bears his name.

The history of Avro aeroplanes is almost synonymous with the history of aviation itself, the firm of A. V. Roe & Co. having been designers and constructors of aircraft for more than 22 years. Some time ago Mr. J. D. Siddeley secured for the Avro Company the British rights for the construction of aircraft of the Fokker type, and already several machines have been produced which have a strong family resemblance to the famous Dutch designer's products, although they differ considerably from them in detail. Of the types which resemble the Fokker machines are the Avro Five, the Avro Six, and the Avro Ten. Other machines which have no resemblance to the Fokkers are the Trainer and the Avian. Even in these, however, traces are to be found of Fokker influence, chiefly in the use of welded steel tube fuselages.

The Avro Five is a three-engined cabin monoplane of medium power, designed for airline work on routes where the traffic is not sufficient to warrant the use of larger machines. The power loading and wing loading of the Avro Five are such that the machine is able to fly on any two of its three engines.

The machine is a high-wing cabin monoplane with accommodation for pilot and four or five passengers. The fuselage is a welded steel tube structure, while the cantilever wing is an all-wood structure, with plywood covering. The pilot's cockpit is totally enclosed and is situated just forward of, and below, the leading edge of the wing. Entrance to the cockpit is through a door in the front wall of the passengers' cabin. The latter has comfortable seating accommodation for four or five passengers. When used as a four-passenger machine, the rear part of the cabin is partitioned off and used as a lavatory.

The power plant consists of three Armstrong-Siddeley "Genet Major" engines, one mounted in the nose of the fuselage and the other two in streamline nacelles under the wing. The petrol tanks are housed in the wing and give direct gravity feed to all three engines. With one engine stopped the machine will maintain its height, fully loaded, up to 5,500 ft. The tare weight is 2,850 lb., the disposable load 1,800 lb. and the gross weight 4,650 lb. The maximum speed is 113 m.p.h. and the cruising speed 95 m.p.h.

The Avro Six is a slightly enlarged version of the Avro Five. Constructionally it is similar, but the cabin is larger and, although the machine is furnished for four passengers only, the lavatory at the back is a standard part of the lay-out, while in the pilot's cockpit forward of the cabin there is room for a second pilot or extra passenger. The arrangement of the engines is also different from that of the Avro Five in that the engine nacelles are placed close under the wing.

The tare weight of the Avro Six is 3,000 lb. The disposable load is 2,000 lb., and the gross weight 5,000 lb., giving a wing loading of 13.9 lb./sq. ft. and a power loading of 16.2 lb./h.p. The maximum speed is 113 m.p.h. and the cruising speed 95 m.p.h.

The Avro Trainer.—This machine is the result of many years of experience in the specialised production of training aeroplanes. The famous Avro 504,

VOICI déjà quelques années que la maison Avro a été rachetée par la Siddeley Development Company, groupe dont font également partie les sociétés Sir W. G. Armstrong Whitworth Aircraft, Ltd., et Armstrong Siddeley Motors, Ltd. La maison Avro, qui figure parmi les plus anciennes de l'industrie aéronautique anglaise, fut fondée en 1910 par Sir Alliott V. Roe et son frère, Mr. H. V. Roe. Sir Alliott Roe ne fait plus actuellement partie de la maison qui porte son nom, mais — quoique la compagnie se rattache à une organisation plus vaste — elle n'en conserve pas moins complètement son individualité, et Mr. Chadwick, collaborateur de Roe dès les premiers jours, en est toujours le chef-dessinateur et principal ingénieur.

Depuis ces dernières années, la société A. V. Roe & Co., Ltd., s'occupe surtout de la construction d'avions civils, bien qu'elle ait sorti aussi un certain nombre de types militaires. Après avoir acquis il y a quelque temps une licence intéressant la fabrication en Grande Bretagne d'appareils de type Fokker, la maison Avro s'est mise à utiliser la construction Fokker, sous une forme modifiée, pour la réalisation de certains appareils tels que ceux des types Avro Five, Avro Six et Avro Ten, tandis que parmi ceux qui se sont le moins ressentis de l'influence de la construction Fokker, il convient de citer l'Avian et le Trainer.

L'Avro Five est un petit monoplan tri-moteur du type cantilever, comportant fuselage en tubes d'acier soudés, aile de monoplan entièrement en bois, et revêtement en contre-placage. Cet appareil peut recevoir à son bord un pilote et quatre passagers. Moteurs Armstrong-Siddeley "Genet Major", dont l'un monté dans le nez du fuselage et deux au-dessous des ailes.

L'Avro Six, généralement analogue à l'Avro Five mais de dimensions légèrement supérieures, peut recevoir deux pilotes et quatre passagers. Muni de moteurs identiques à ceux de l'Avro Five, avec cette différence que les moteurs d'aile y sont montés à proximité de la face inférieure des plans, dans des nacelles convenablement fuselées.

Quant à l'Avro Ten, il s'agit d'un appareil de bien plus grandes dimensions, pouvant transporter dix voyageurs, et doté de moteurs plus puissants.

L'Avro Trainer est un biplan à deux places,



Avro Six small commercial aeroplane.
Petit avion commercial Avro Six.
Avro Six, aeroplano comercial pequeño.

conçu pour la formation des élèves. Il réunit tous les perfectionnements qu'ont pu inspirer les enseignements fournis au cours de nombreuses années par le célèbre Avro 504, créé dès 1913 et dont il s'utilise encore différentes variantes à l'heure actuelle. Le Trainer comporte un fuselage en tubes d'acier soudés, avec revêtement en toile; l'entoilage de la partie-avant, disposé sous forme de grands panneaux, peut s'enlever afin de révéler ainsi à la vue toute la structure inférieure. Deux postes spacieux, identiques jusqu'au moindre détail, et, bien entendu, munis d'un système de doubles commandes.

Ailes de construction entièrement métallique, avec longerons principaux en ruban d'acier et nervures en duralumin. Le Trainer peut s'équiper à l'aide du moteur "Lynx" ou du moteur "Mongoose," tous deux de construction Armstrong-Siddeley.

L'Avro Avian est un biplace léger, avec ailes de biplan principalement en bois et fuselage en tubes d'acier soudés. L'Avian peut recevoir différents moteurs au choix, soit l'Armstrong-Siddeley "Genet Major," soit le "Cirrus Hermes," ou encore le De Havilland "Gipsy." Citons enfin une création toute récente: l'Avian Sports, analogue à l'Avian normal mais dont les profils fuselés sont encore d'une plus grande finesse. C'est à bord d'un appareil de ce type, légèrement modifié, que le Commandant Kingsford Smith a accompli en 10 jours sa magnifique randonnée d'Angleterre en Australie.

ALGUNOS años atrás el activo y pasivo de la empresa Avro fué adquirido por la sociedad Siddeley Development Company, mientras que otras de las firmas del grupo son: Sir W. G. Armstrong Whitworth Aircraft Ltd., y Armstrong Siddeley Motors, Ltd. La empresa Avro es una de las más antiguas en la industria británica de aviación, pues fué fundada por Sir Alliott V. Roe y su hermano Mr. H. V. Roe en el año 1910. Sir Alliott Roe ya no está relacionado más con la firma que lleva su nombre pero, a pesar de que la compañía forma parte de una organización más importante, dicha casa ha conservado su individualidad completa, y Mr. Chadwick que se hallaba en la empresa Avro en los primeros tiempos de su establecimiento todavía es el ingeniero jefe y principal proyectista.

Durante los últimos años la casa A. V. Roe & Co., Ltd., se ha concentrado principalmente en la producción de aparatos de aviación civil, si bien se han construido igualmente cierto número de tipos para fines militares. Hace ya algún tiempo la casa Avro adquirió la licencia para la construcción en Inglaterra de los aparatos de aviación del tipo Fokker, y desde entonces se ha empleado una forma variada de la construcción Fokker para la producción de tales tipos como el Avro

it may be pointed out, first appeared in 1913 and has, with modifications from time to time, notably in the substitution of new engines when they became available, been in constant and extensive use ever since, and is still one of the best machines in the world for its particular purpose. The "Trainer" is, so to speak, the modern equivalent of the famous 504, in that it bears the same relation to modern military types of aircraft as did the 504 to the military types of aircraft some 10 years ago. Consequently the "Trainer" can be used for the complete instruction of pilots without the need for advanced training on other types. When required for training seaplane pilots the machine can be fitted with a float under-carriage.

The Avro "Trainer" is an equal-span single-bay biplane, having considerable stagger in order to improve the view and enable the occupant of the forward seat to get away by parachute in case of trouble. An important feature of the machine is that the two cockpits are identical in size and position of controls. Thus, when a pupil changes from the front to the rear seat, he is not confused by being in a cockpit in which the controls, and more particularly engine controls, instruments, etc., are in unaccustomed positions.

The fuselage of the "Trainer" is a welded steel tube structure, and the fabric covering is attached to large panels which bring the rectangular section of the main structure up to a streamline form. These panels can readily be removed, and the whole of the fuselage structure underneath is then open for inspection. The inside of the fuselage framework in way of cockpits is covered with leatherette so that the occupant sees nothing of the steel tube framework. This at once gives an impression of tidiness, and one wonders that aircraft have for so many years been left with their not very pretty structure, wires, etc., exposed to view. It is always a matter of some difficulty to clean the cockpit of a machine properly, and in a school machine used in all sorts of weather and on all sorts of aerodrome surfaces it is inevitable that a lot of dirt should get carried into the machine by the feet of the pilot and pupils. In the "Trainer" provision has been made for cleaning by fitting a scoop behind the cockpits, into which can be swept the dirt and sand. The scoop is then tilted down and the dirt falls out.

All-metal wings (except the covering) are fitted on the "Trainer," the main spars being steel strip, and the wing ribs of light metal.

The engine fitted to the "Trainer," as standard, is the Armstrong Siddeley "Mongoose" of 150 h.p. This engine supplies ample power for school work in most countries, and certainly in Great Britain. There are, however, cases where an aerodrome is situated at a considerable height above sea level, or in a very hot climate with air of small density. For such cases, the Armstrong Siddeley "Lynx" of 215 h.p. can be substituted.

When the "Trainer" is fitted with the "Mongoose" engine the tare weight is 1,560 lb., the disposable load 658 lb., and the gross weight 2,218 lb. The maximum speed is 110 m.p.h., the cruising speed 95 m.p.h., the initial rate of climb 675 ft./min., and the service ceiling 12,400 ft.

With the Armstrong Siddeley "Lynx" engines these figures become: tare weight, 1,722 lb.; disposable load, 658 lb.; gross weight, 2,380 lb.; maximum speed, 116 m.p.h.; cruising speed, 100 m.p.h.; initial climb, 1,000 ft./min.; service ceiling, 18,500 ft.

The Avro Avian two-seater light aeroplane comes of a line of worthy ancestors, the Avro Co. having produced what was probably the first light aeroplane in the world, the "Avro Baby," which appeared in 1919, and on one of which Mr. Bert Hinkler put up some splendid flights. The "Baby" was followed by several ultra-light aeroplanes, and then for the British Light Aeroplane Competition at Lympne in 1926, was produced the first "Avian."



Avro Trainer school machine. (Lynx engine.)
Appareil d'entraînement Avro Trainer (moteur Lynx).
Avro Trainer, avión para instrucción (motor Lynx).



Avro Avian light aeroplane 2-seater.
Biplane léger Avro Avian.
Avro Avian, aeroplano ligero de dos asientos.

This was a very lightly built two-seater, with large wing area so as to gain points in the competition by carrying a very heavy load. It was on this same machine, fitted with a "Cirrus" engine, that Bert Hinkler flew from England to Australia in 15½ days, a record which has but recently been beaten by Wing Commander Kingsford Smith, on one of the very latest "Avians." The "Avian" is built under licence in Canada and the United States. Recently a new version of the "Avian" has been produced. This is known as the "Avian Sports," and is a "cleaned up," i.e., carefully streamlined, version of the standard "Avian."

The standard "Avian" can be obtained fitted either with the 100 h.p. Armstrong Siddeley "Genet Major" engine or with the 105 h.p. "Cirrus Hermes." The "Sports Avian" is fitted with the "Cirrus Hermes."

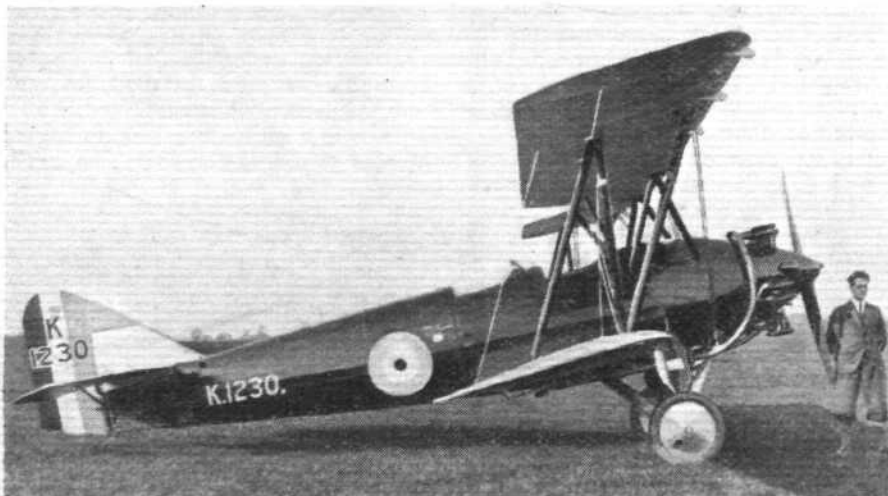
The "Avian" has a fuselage of welded steel tube, covered with fabric, and wooden wings with I-section spruce spars, and spruce and plywood ribs. The internal drag struts are steel tubes. The wings are arranged to fold, and balanced ailerons are fitted to the lower wing only.

Both standard and sports "Avians" have open cockpits placed in tandem and fitted with dual controls. The control columns are removable and the rudder bars adjustable. A tail trimming gear is provided, and can be operated from either cockpit. There is a large luggage locker behind the rear cockpit.

The standard "Avian" is fitted with a split type undercarriage of wide track (6 ft.), while the Sports "Avian" has a small touring undercarriage with transverse axle. In both types the shock-absorbing medium is rubber blocks in compression.

The tare weight of the "Avian" is 1,000 lb., the disposable load 600 lb., and the gross weight 1,600 lb. The maximum speed is 100-105 m.p.h., and the cruising speed 90 m.p.h. The cruising range is 360 miles.

These figures refer to the standard "Avian." The "Sports Avian" has approximately the same weight, but the maximum speed is 120 m.p.h., and the cruising speed 105 m.p.h.



Avro Trainer school machine. (Armstrong-Siddeley Mongoose engine.)
Appareil d'entraînement Avro Trainer (moteur Armstrong-Siddeley Mongoose).
Avro Trainer, avión para instrucción (motor Armstrong-Siddeley Mongoose).

"Five," Avro "Six," y el Avro "Ten." Entre los tipos que muestran menor semejanza al Fokker se pueden citar el Avian y el Trainer.

El aparato Avro "Five" es un monoplano pequeño del tipo cantilever dotado de tres motores, con un fuselaje de construcción de tubos de acero soldado y una ala de monoplano fabricada enteramente de madera, con revestimiento de madera terciada. Este modelo está dotado del alojamiento necesario para el piloto y cuatro pasajeros. Los motores de que está provisto son del tipo "Genet Major" de Armstrong Siddeley, uno montado en la punta del fuselaje y los otros dos montados por debajo de las alas.

El aparato Avro "Six" es parecido al tipo Avro "Five" en cuanto a construcción general, pero es algo más grande, y lleva el alojamiento necesario para dos pilotos y cuatro pasajeros. Está provisto de los mismos motores que el tipo Avro "Five," pero los motores montados por debajo de las alas están dispuestos más cerca de los planos en cunas cuyo delineado presenta resistencia mínima a la corriente de aire.

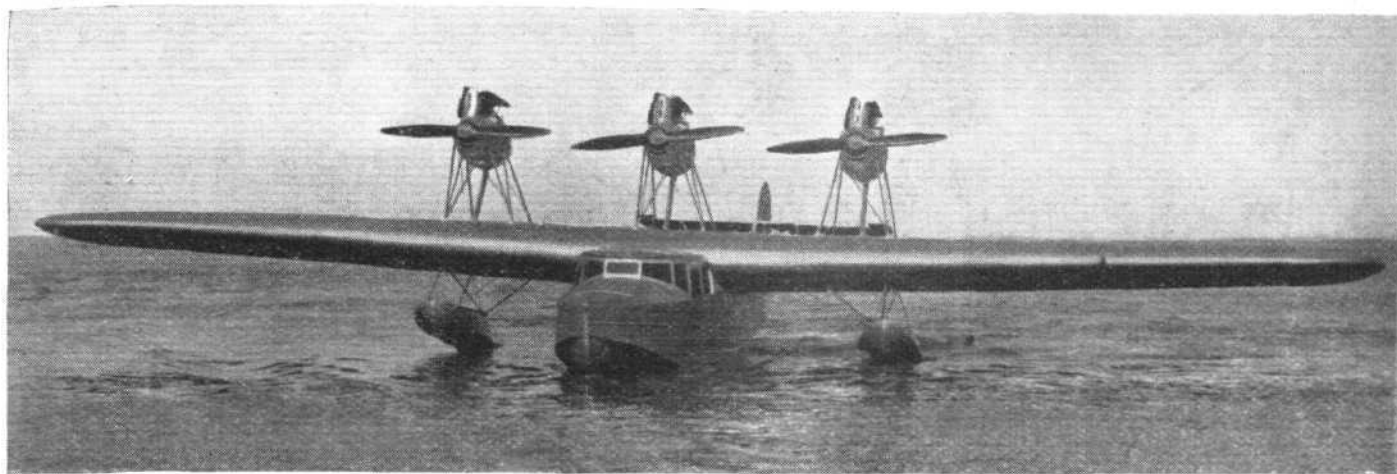
El aparato Avro "Ten" es un avión de tamaño mucho más grande, con los asientos necesarios para diez pasajeros, y está dotado de motores más potentes.

El avión Avro "Trainer" es un biplano del tipo de dos plazas que ha sido ideado para prestar servicio en las escuelas de aviación. En este modelo se han incorporado todas las mejoras sugeridas por los muchos años de experiencia con el famoso Avro 504, el primero de cuya categoría fué construido en el año 1913 y que todavía se emplea para fines diversos. El avión "Trainer" está provisto de un fuselaje hecho de tubos de acero soldados con revestimiento de tela. El recubrimiento de la parte delantera está dispuesto en tal forma que puede ser quitado en paneles de gran tamaño, dejando así expuesta toda la estructura inferior. Los dos puestos de pilotaje son muy espaciosos, idénticos bajo todo concepto y provistos, como es de suponerse, de controles dobles.

Las alas son de construcción enteramente metálica, con los largueros principales hechos de tira de acero y las costillas de duraluminio. El aparato de aviación "Trainer" puede ser suministrado ya sea con motor "Mongoose" o "Lynx" de Armstrong Siddeley.

El aparato Avro "Avian" es un aeroplano de dos plazas, del tipo ligero, con alas de biplano hechas principalmente de madera y un fuselaje construido de tubos de acero soldado. El aparato de aviación "Avian" puede ser suministrado con una variedad de motores, ya sea el "Genet Major" de Armstrong Siddeley, el "Cirrus Hermes" o el "Gipsy" de Havilland. Últimamente se ha producido un nuevo tipo de avión, a saber, el "Avian" de Sport, el cual se asemeja mucho al "Avian" de tipo normal excepción hecha de que se ha tomado mayor cuidado en el delineado para que no presente resistencia a la corriente de aire. El Comandante de flanco de escuadrilla Kingsford Smith al emprender últimamente el raid desde Inglaterra a Australia en 10 días, se valió de un avión de este tipo pero algo modificado.





Saro Windhover 3-engined flying-boat.
Hydravion monocoque trimoteur Saro Windhover.
Avión marino Saro Windhover, de tres motores.

SARO

SAUNDERS-ROE, LIMITED,

WORKS: EAST COWES,
ISLE OF WIGHT

LONDON OFFICE: BUSH HOUSE,
ALDWYCH, W.C.2

APRÈS s'être retiré de la maison Avro, Sir Alliott V. Roe, de concert avec l'ami de toute son existence, Mr. John Lord, s'est occupé d'acquérir des intérêts prépondérants dans les chantiers S. E. Saunders, à Cowes, où depuis plus de 20 déjà Mr. Saunders se consacrait à l'étude et à la construction de canots automobiles, hydravions monocoques et autres appareils d'aviation. Sous son nouveau régime, la maison Saunders-Roe—habituellement désignée par l'abréviation "SARO"—commença donc à mettre en chantier toute une série d'hydravions marins, de construction similaire mais de dimensions et de puissances différentes, comportant tous une coque en duralumin et des ailes en bois. Le plus petit est le "Cutty Sark" à quatre places et deux moteurs "Hermes." Ensuite, vient le "Windhover," appareil à six places, puis le "Cloud" qui est capable de prendre à son bord de 8 à 10 passagers. Chacun de ces trois types peut s'aménager en appareil amphibie et comporter différents groupes moto-propulseurs, au choix.

C'est également la maison Saunders-Roe qui construisit le premier appareil terrestre "Meteor" bi-moteur, sur les plans de feu Sir Henry Segrave. Il doit se construire d'autres appareils de ce type par la Blackburn Company qui—de même que Saunders Roe—figure au nombre des participations de l'Aircraft Investment Corporation Limited.

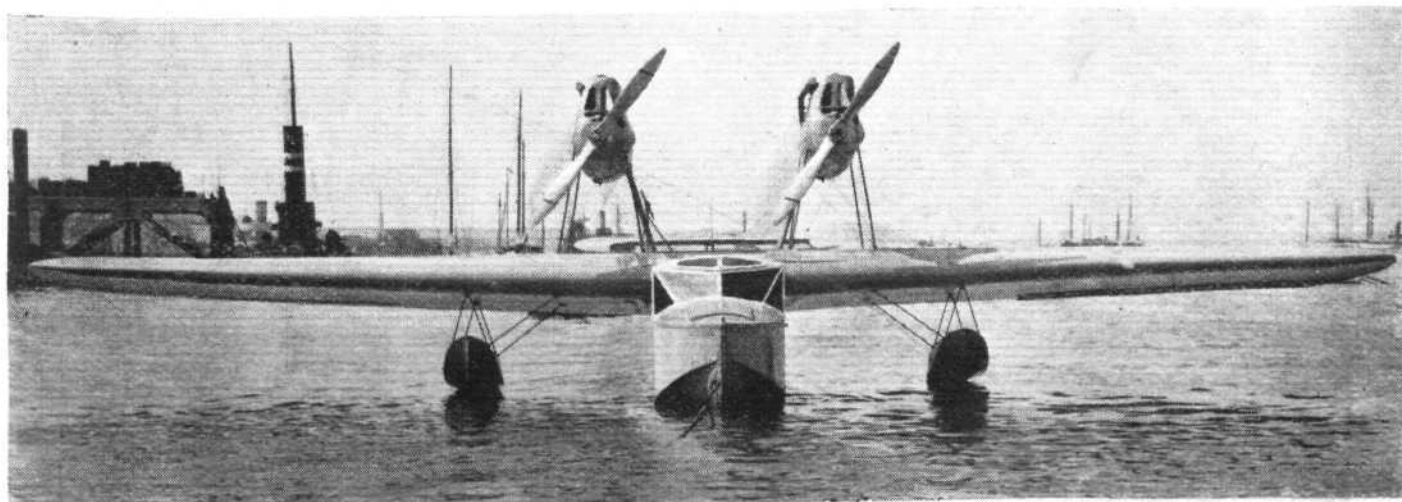
AFTER severing his connection with the firm which bears his name, Sir Alliott V. Roe, with his old friend and associate, Mr. John Lord, acquired a controlling interest in another old-established British firm: S. E. Saunders, of East Cowes, Isle of Wight. The new firm was renamed Saunders-Roe, Ltd., usually abbreviated into Saro, and a vigorous policy of development was at once instituted, with Mr. Knowler as chief designer.

Mr. Saunders having been a designer and builder of motor boats for 50 years or more, and Sir Alliott Roe and Mr. Lord being believers in the flying-boat type of machine, it was natural that the firm should turn its attention to this type of aircraft. At Olympia last year was exhibited the first Saro machine, the little "Cutty Sark" with two Hermes engines. That machine was the first of quite a little "family" of amphibian flying-boats, the third of which appeared a few weeks ago, and is known as the "Windhover," while the second member of the family made its appearance some time ago and is called the "Flying Cloud."

In all three machines the constructional features are similar, and a description of one will, with minor modifications, apply to all three. First, however, it should be pointed out that the three amphibian flying-boats mentioned cover a range in size, power and carrying capacity calculated to meet the requirements of all but those desiring really large seagoing civil flying-boats. The "Cutty Sark" is the smallest of the three, and carries pilot and three passengers. The "Windhover" comes next as a six-seater, and the "Cloud" last as an 8-10 seater.

Two main features of construction were decided upon from the outset in planning the Saro amphibian flying-boats. They were to have wooden cantilever wings and light metal hulls, the wings and hulls to be built as complete units so as to reduce maintenance costs to a minimum.

The Saro wing construction consists of two main spars of box section with spruce flanges and three-ply walls, while the ribs are of three-ply. The entire wing is covered with three-ply, and in the neighbourhood of the engines this is made thick enough to walk on. This wing construction is simple, does not



Hydravion monocoque quadruplace
Saro Cutty Sark.

Saro Cutty Sark 4-seater flying-boat.

Avión marino Saro Cutty Sark, de
cuatro asientos,



Saro Cloud amphibian flying-boat.
Hydravion monocoque amphibie Saro Cloud.
Avión marino anfíbio Saro Cloud.

get out of truth, and no special dopes are required. Also, such a wing will float the machine in case of accident.

The Saro hull construction consists of light transverse frames to which is riveted the light metal planking. This is corrugated in a fore-and-aft direction, and thus avoids the need for internal fore-and-aft stringers in the hull construction. The material used for the hull planking is "Alclad," which is very resistant to corrosion.

The "Cutty Sark" has two Cirrus Hermes engines mounted on top of the wing. The cabin is ahead of the wing, and there are four seats, one for the pilot and three for passengers. The cabin is provided with large windows and thus is light and airy, while the view is good. The petrol tanks are placed in the wing. A retractable land undercarriage can be fitted when the machine is used as an amphibian.

The Saro "Windhover" has three "Gipsy II" engines mounted on struts above the wing, and is able to fly on any two of the three engines. The passenger accommodation has had to be divided in order to maintain the trim of the machine. There are four seats in the main forward cabin, and two more a little farther aft, between the two main spars of the wing. This small cabin is lighted by two windows in the sides of the hull. Like the "Cutty Sark," the "Windhover" can be fitted with a land undercarriage.

The Saro "Cloud" is, as already mentioned, an 8-10 seater. The cabin lay-out is somewhat similar to that of the "Windhover," with the passengers' quarters divided into two by the forward main spar. The main cabin is 10 ft. 6 in. long, and has an average head room of 6 ft. Aft of the cabin is a lavatory, and aft of that again a main companionway to the deck.

The first "Cloud" has been fitted with two Wright "Whirlwind" engines, but other engines of approximately the same total power can be installed. Owing to the form of engine installation, the changing of an engine is very quickly carried out.

All three Saro amphibian flying-boats can be supplied with a variety of power plants, and, in addition, the number of engines in each class can be varied to suit the purchaser's requirements. In fact, it should be possible to use either of the three machines as a single-engined, twin-engined or three-engined type.

During 1930, Saunders-Roe built for the Aircraft Investment Corporation the twin-engined "Meteor" monoplane with Gipsy engines. This machine was designed by Sir Henry Segrave shortly before his death, and he did not live to see its further development.

DESPUÉS de haber terminado sus relaciones con la casa Avro, Sir Alliott V. Roe junto con su amigo de toda la vida Mr. John Lord, adquirieron la mayoría de las acciones de la empresa S. E. Saunders, de Cowes, I.O.W., Inglaterra. Desde hace más de 20 años Mr. Saunders se ha dedicado al diseño y la construcción de botes automóviles, hidroaviones de alta mar tipo "flying boat" y otros aparatos de aviación. Bajo la nueva dirección la empresa Saunders-Roe, generalmente abreviada en la forma de "Saro," dió principio a la producción de una serie de hidroaviones del tipo "flying boat," de construcción más o menos semejante pero de tamaños y potencias diferentes. Todos estos aparatos están dotados de cascos de duraluminio para los "botes voladores" y alas de madera. El modelo más pequeño es el "Cutty Sark," un aparato de cuatro plazas provisto de dos motores "Hermes." Luego le sigue el modelo "Windhover" un aparato de seis plazas y por último el modelo "Cloud," con alojamiento necesario para sentar 8 a 10 pasajeros. Todos estos tres tipos pueden suministrarse en la forma de anfibios, cada uno de los cuales puede estar provisto de motores diversos.

La casa Saunders-Roe también construyó el primer aeroplano terrestre "Meteor" dotado de motores gemelos, ideado por el finado Sir Henry Segrave. Otros de los tipos de esta máquina serán construidos por la compañía Blackburn la cual, lo mismo que la empresa Saunders-Roe, es una de las compañías afiliadas de la Aircraft Investment Corporation Ltd.



Avion Segrave Meteor construit par Saunders-Roe.

Segrave Meteor built by Saunders-Roe.

Avión Segrave Meteor, construido por Saunders-Roe.



Short Valetta 3-engined seaplane.
Avion marin trimoteur Short Valetta.
Hidroplano Short Valetta de tres motores.

SHORT

SHORT BROTHERS (ROCHESTER & BEDFORD), LTD.

WORKS: ROCHESTER,
KENT

LONDON OFFICE: WHITEHALL HOUSE,
29-30, CHARING CROSS, S.W.1

Au nombre des plus anciennes firmes anglaises de construction aéronautique il faut compter Short Brothers. Leurs premières activités commencèrent en 1909 dans l'île de Sheppey, sur l'estuaire de la Tamise. Avant cette époque les frères Short avaient fait de l'aérostation et fabriqué des ballons. Pendant la guerre ils construisirent un grand nombre d'hydravions, et depuis la guerre la maison a concentré son énergie principalement sur les hydravions à coque et à flotteurs.

Le premier hydravion monocoque Short qui se soit fait une renommée fut le "Singapore," dans lequel Sir Alan Cobham fit le tour de l'Afrique. Cet appareil fut suivi du "Calcutta," employé par Imperial Airways, Ltd., sur la section méditerranéenne de la ligne aérienne Londres-Inde. Le "Calcutta" diffère légèrement du "Singapore" par la forme de sa coque et aussi par ses trois moteurs, qui sont des Bristol "Jupiter." Il existe un modèle "Calcutta" militaire, qui a été établi pour le service de l'Aviation Royale de Grande Bretagne. Un autre hydravion militaire de production récente est le "Singapore II," généralement semblable au "Singapore" primitif, mais qui comporte des moteurs Rolls-Royce type F. Le "Singapore II" est probablement le plus rapide hydravion monocoque du monde.

Après le succès du "Calcutta," on s'avisa qu'il serait intéressant de pouvoir établir une comparaison entre un hydravion monocoque et un hydravion à deux flotteurs, et c'est pour rendre possible cette comparaison que fut construit le Short "Valetta." C'est un monoplan trimoteur entièrement métallique, présentant approximativement le même poids brut que le "Calcutta," mais qui a un fuselage analogue à celui d'un avion terrestre et deux flotteurs au lieu d'une coque centrale. Le châssis à flotteurs est établi de manière à pouvoir être remplacé par un train d'atterrissage à roues; ainsi le même type d'appareil peut s'utiliser sur différentes sections d'une même ligne aérienne nécessitant des avions marins et terrestres. Cet avantage permettrait à la société exploitante de n'employer qu'un seul type d'appareil, ce qui réduirait les frais d'exploitation.

Il y a encore un autre type d'avion en construction en ce moment aux usines Short Brothers à Rochester. C'est un hydravion monocoque semblable dans ses lignes générales au "Calcutta," mais plus grand que ce dernier, et qui doit être mis en service l'année

FAMOUS in the British aviation world is the name Short Brothers. From the earliest days of British aviation the name has been a familiar and honoured one. The brothers Short—Horace, Eustace and Oswald—began work on the Isle of Sheppey somewhere around 1909 or 1910, and the firm has remained a very active one ever since. Horace Short was not granted the satisfaction of living to see the fruits of his early work, but Oswald and Eustace Short are carrying on the traditions of the firm in the finest possible spirit, and the contribution of Short Brothers to the progress of British aviation has been and continues to be a very important one.

Of recent years the Short works at Rochester have been chiefly associated with the production of large seaplanes, and it is with this branch of their activities that we propose to deal here.

The first modern Short flying-boat to achieve renown was the "Singapore," on which Sir Alan Cobham made a flight to and around Africa. Originally designed for military work, the "Singapore" was lent to Sir Alan for his African flight. When he returned to England, the experience gained by him during the flight around Africa was made good use of in the design and construction of the first "Calcutta" flying-boat for Imperial Airways, Ltd. This machine differs from the "Singapore" in certain minor respects although the hull form, etc., is very similar. The difference lies chiefly in the power plant arrangement. Whereas the "Singapore" had two Rolls-Royce "Condor" engines, the "Calcutta" is fitted with three Bristol "Jupiters."

The Short "Calcutta" was the first British all-metal commercial flying-boat to be produced, and made its first appearance early in February, 1928. It is a 14-passenger machine, with the cabin situated in the middle of the flying-boat hull, underneath the lower wing of the biplane structure. The fact that the wing is above the cabin results in giving the passengers an excellent view outwards and downwards, entirely unobstructed. The passengers' seats are arranged unsymmetrically, i.e., on the port side there are single seats along the outer wall, while on the starboard side there are two seats abreast. The pilot's cockpit is in front of the cabin and wings, where he obtains a good view, and in the extreme bows there is a hatch used during the mooring operations, i.e., while picking up or dropping moorings.

The biplane wing structure has very simple bracing, with but one pair of interplane struts on each side, in addition to those carrying the engines.

Lateral stability on the water is ensured by outboard wing floats placed under the outer interplane struts.

As the construction of the "Calcutta" is typical of all Short flying-boats it will be dealt with in some detail, and readers are asked to remember that, in the main, all the other types are of generally similar construction, although with minor variations.

The type of flying-boat construction now standardised by Short Brothers had its origin in an experimental fuselage designed and built shortly after the war. For the first time in history, a system of construction was employed in which the covering or metal planking was made to perform the functions of fore-and-aft structural members. The transverse members were in the form of rings or hoops of L-section, and to these the outer planking was riveted. A few light longitudinal stringers were used to stiffen the planking, but these stringers were interrupted at the frames or hoops, and did not run through from end to end. The same type of construction is now standard



Short Calcutta commercial flying-boat.
Hydravion monocoque commercial Short Calcutta.
Avión marino comercial Short Calcutta.

in all Short boats, with only such small modifications as have been made necessary by the slightly different shape of a flying-boat hull, as compared with a circular-section fuselage. The system is light and simple, and has the great advantage of avoiding cutting into the frames to house the stringers.

The Short all-metal wing construction, like the hull, also makes use almost exclusively of duralumin. The main wing spars are of built-up box section, both the spar flanges and the upright walls being of corrugated section, riveted along the joints. In order to proportion the wall thickness of the spars to local loads, lamination is resorted to, and in heavily-stressed positions on the spars, four or five laminations may be found. The wing ribs are also of duralumin, but are of tubular form, with the exception of certain former ribs which have to be of greater strength, and which, therefore, are of box section. The wing covering is of fabric.

For a number of years, Mr. Oswald Short held the view that there was just a possibility that the flying-boat might not necessarily be the best solution, at least for certain kinds of work, and he was anxious to build a twin-float machine in order to obtain a direct and convincing comparison between flying-boat and float seaplane. Such an opportunity occurred in 1929, when the Short firm obtained an order for a three-engine float seaplane, to be of approximately the same power and carrying capacity as the "Calcutta."

This machine, which was given the type title "Valette," is a three-engined twin-float cabin monoplane of all-metal construction, and incorporates a number of unusual features. In its design high aerodynamic efficiency is aimed at, and an examination of the front view shows how very clean the "Valette" is. The wing is placed on top of the fuselage, and braced by a somewhat unusual arrangement of struts. From the corners of the fuselage spring struts forming outriggers, and from the outer apices of these outriggers the wing bracing struts run to the main spars. At the same time the struts which support the floats are attached to the outriggers, so that a very wide float track is attained without structure members coming down low over the water, where they would be liable to make the machine "dirty" during take-off.

One of the XI F geared "Jupiters" is mounted in the nose of the fuselage, while the other two are slung from the wing spars in streamline nacelles. It is to be noted that the wing spars take the entire weight of the outboard engines, which are not braced to the outriggers and float structure.

The fuselage is of generally similar construction to that of the hull of the "Calcutta," but, of course, with minor modifications caused by the difference in shape. The wing structure also is generally similar to that of the "Calcutta," but as the machine is a monoplane and thus of much greater chord, the wing spars naturally are much deeper and the gauge of duralumin used in the construction is considerably heavier.

A feature of the "Valette" is that for the float undercarriage can be substituted a wheel undercarriage, so that the machine can also be used as a land plane. This interchangeability might be of very great advantage on long air routes where certain sections call for seaplanes and others for land planes. By using the "Valette," the operating company would not have to go to the expense of a duplication of aircraft types.

Although primarily an experimental aircraft, the "Valette" is completely equipped for passenger service. The cabin has seating accommodation for 16 passengers, but this number is subjected to alteration according to the service for which the machine is required.

Particulars of weights and performance both for the "Calcutta" and the "Valette" will be found in the table on page 1319, from which a comparison between the two machines can be made.

As a result of the experience gained with the original "Singapore" and with the "Calcuttas," Short Brothers were given an order for an improved type of "Singapore," which has become known as the "Mark II." The "Singapore Mark II," although generally similar to the original "Singapore" and to the "Calcutta," has been considerably modified in many respects,

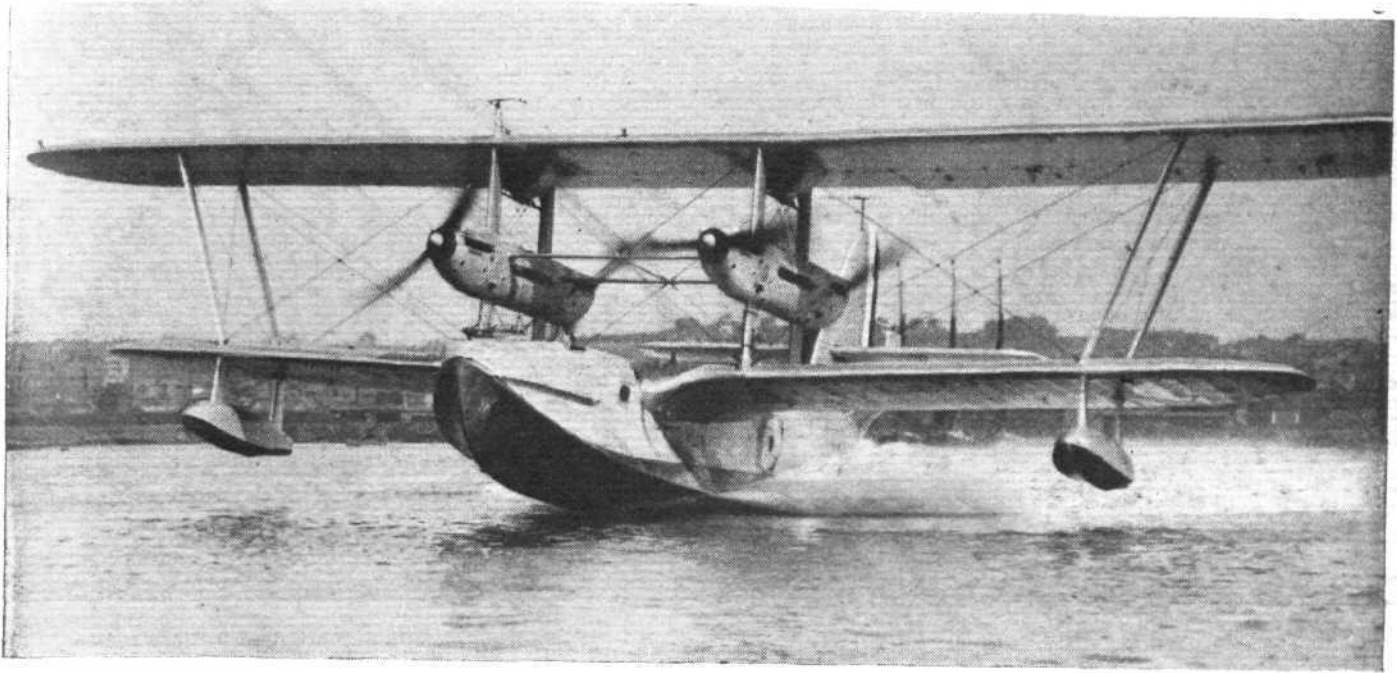
prochaine par Imperial Airways. Cet appareil, actionné par quatre moteurs Bristol "Jupiter," pourra transporter 16 passagers ainsi qu'une grande quantité de sacs postaux.

Tous les avions Short sont de construction entièrement métallique, et emploient principalement le duralumin. Toutefois le type le plus récent d'hydravion aura sa carène doublée d'acier inoxydable.

LA SOCIEDAD SHORT BROTHERS
L puede contarse como una de las empresas más antiguas en Inglaterra que se ocupa de la construcción de aparatos de aviación. Sus primeras actividades comenzaron en el año 1909, en la Isla de Sheppey, en el estuario del río Támesis. Antes de dicha época los hermanos Short eran aeronautas y fabricantes de globos aerostáticos. Durante la gran guerra europea, esta empresa se encargó de la construcción de un gran número de hidroaviones, y después de terminadas las hostilidades la casa ha concentrado sus actividades principalmente en la construcción de hidroaviones y botes voladores.

El primero de los botes voladores Short que ganó fama fué el "Singapore," en el cual Sir Alan Cobham emprendió un vuelo alrededor del Africa; luego le siguió el bote volador "Calcutta" empleado por la empresa Imperial Airways Ltd., en la sección del Mediterráneo de la línea aérea de Londres a la India. El bote volador "Calcutta" se diferenciaba ligeramente del "Singapore" en cuanto a la forma del casco del bote, y también por el hecho de haber estado provisto de 3 motores Bristol "Jupiter." Se ha producido un tipo militar del bote volador "Calcutta" para uso por el Real Servicio Británico de Aviación. Otro de los botes voladores de tipo militar de producción reciente es el "Singapore II," cuya construcción se asemeja por lo general a la del aparato "Singapore" original, pero está provisto de cuatro motores Rolls-Royce del tipo "F." El aparato "Singapore II" es, quizás, el bote volador más veloz del mundo entero.

Después del éxito alcanzado por el bote volador Short "Calcutta," se creyó que sería interesante hacer una comparación entre un bote volador y un hidroavión provisto de flotadores gemelos y, a fin de poder llevar a cabo esta comparación, se construyó el hidroavión "Valette" de Short. El referido hidroavión "Valette" es un monoplano de construcción enteramente metálica, dotado de tres motores, y es de casi el mismo peso bruto que el bote volador "Calcutta," pero



Short Singapore II.

tiene un fuselaje de forma semejante al de un aeroplano terrestre y dos flotadores en lugar del casco del bote volador. El tren inferior de flotadores ha sido ideado en tal forma que se puede substituir por un tren de aterrizaje de ruedas, de modo que se puede hacer uso del mismo tipo de aparato en secciones distintas de una línea aérea de gran longitud, en la cual se necesitan hidroaviones y aeroplanos terrestres. Este modo de proceder ahorraría materialmente los gastos de operación pues permitiría que una compañía cualquiera emplease un solo tipo de máquina.

En las fábricas de Rochester de la casa Short Brothers hay otro tipo de aparato de aviación en curso de construcción. Este es un bote volador que, por lo general, se asemeja mucho al tipo "Calcutta" aunque de dimensiones mayores, y será empleado el año que viene por la empresa Imperial Airways Ltd. Este bote volador, dotado de cuatro motores Bristol "Jupiter," estará provisto del alojamiento necesario para el transporte de 16 pasajeros y una gran cantidad de correos.

Todos los aparatos de aviación de la casa Short Brothers son de construcción enteramente metálica, siendo el duraluminio el material que se emplea en mayor escala. Sin embargo, el bote volador del tipo más moderno tendrá el fondo del casco revestido de planchas de acero inoxidable.

and the result is that it is believed to be the fastest flying-boat in the world. The hull of the "Singapore Mark II" is generally similar to that of the "Calcutta," but the superstructure has been differently arranged. This re-arrangement is due partly to the fitting of four Rolls-Royce F XII engines in two tandem pairs, and partly to the fact that no struts are used for bracing the inter-plane engine struts to the boat hull. These concentrated weights are taken in the "Singapore Mark II" on thick wing roots built integral with the hull, and the absence of the sloping struts to the chines of the boat has resulted in a marked increase in the clean running.

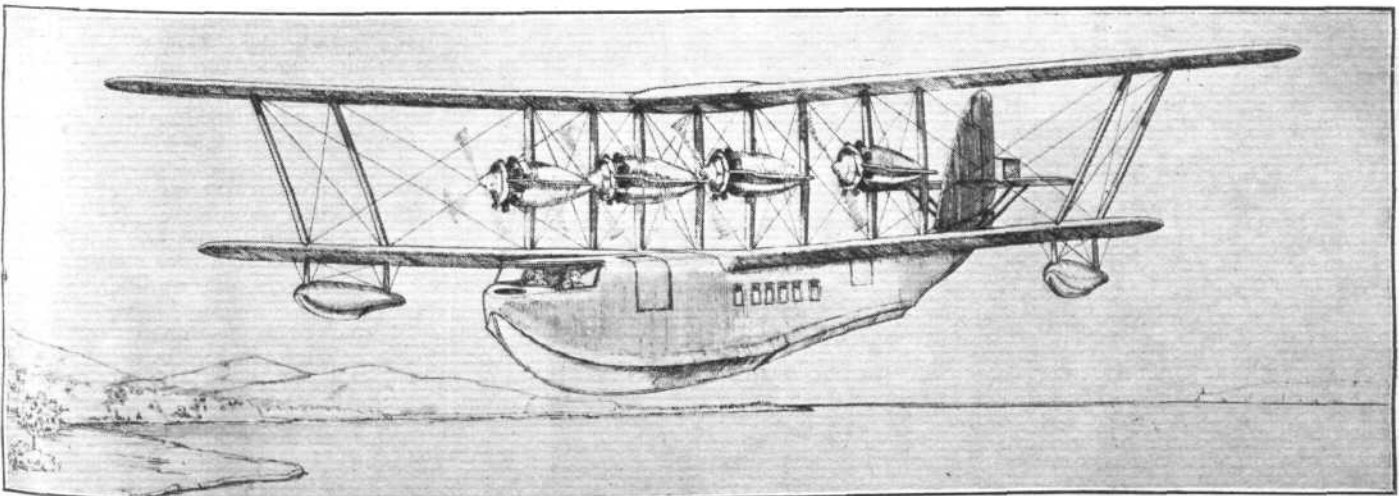
The arrangement of the Rolls-Royce engines in tandem pairs has considerably reduced the frontal area, and the "Singapore Mark II" is in consequence one of the cleanest aircraft with four power plants ever produced. As the machine is a Service type data of performance may not be given.

Now in course of construction at the Rochester works of Short Brothers is yet another large flying-boat. This is a civil type, and is to be used by Imperial Airways on the Mediterranean section of the air route from England to India and South Africa in 1931.

The new machine will be a 4-engined type, and will be fitted with four Bristol "Jupiter XI B.M." engines. These engines are moderately supercharged and given their maximum power at 5,000 ft. It is believed that the in-line abreast engine arrangement has been chosen in order to give accessibility to all engines.

The new 4-engined Short has a strong family resemblance to the "Calcutta," but is a much larger machine both in dimensions and weight. The construction is very similar, generally speaking, to that of other Short machines.

At the request of Imperial Airways the space in the flying-boat hull has been so planned as to give approximately an even division between passenger load and mails. The passenger accommodation has therefore been reduced to 16 seats, arranged in four rows of four each. This load does not, of course, represent more than about 50 per cent. of the pay load of the machine, the rest being utilised for mails.



Short 4-engined Calcutta to be put on the air route in 1931.

Avion Short Calcutta quadrimoteur qui sera mis en service en 1931.

Avión Short Calcutta de cuatro motores, para entrar en servicio en 1931.



Southern Martlet with Gipsy engine.
Southern Martlet avec moteur Gipsy.
Southern Martlet, con motor Gipsy.

SOUTHERN

SOUTHERN AIRCRAFT, LTD.,
SHOREHAM-BY-THE-SEA, SUSSEX

FOUR distinct types of the "Martlet" single-seater light aeroplane produced by Southern Aircraft, Ltd., are available, differing mainly in their power plant. The first to be built was fitted with the A.B.C. "Hornet," and proved amazingly manoeuvrable, as well as having a very good performance. Next came a "Martlet" fitted with the Armstrong Siddeley "Genet" engine, then one with De Havilland "Gipsy II," and quite recently the latest model has been fitted with the "Genet Major."

The "Martlet" has been designed by Mr. Miles, of Southern Aircraft, Ltd., and is of mixed construction. It is a biplane of very pleasing lines, and with all four power plants mentioned has an excellent performance.

Mr. Miles produced the "Martlet" specially for pilots who, lacking the means or opportunity to fly high-power single-seater fighters, wish to have a machine of low cost on which they can practise "aerobatics" to their heart's content. The machine has been designed with high factors of safety, and is strong enough to perform all the usual "stunts" demanded from much more powerful machines. At the same time, the power reserve is such that not only high top speed is attained, but also a very spectacular climb. The speed range is excellent, and the "Martlet," very far from being a difficult machine to fly, is, pilots report, remarkably easy to handle.

Performance figures for two of the types will be found in the table on p. 1319.



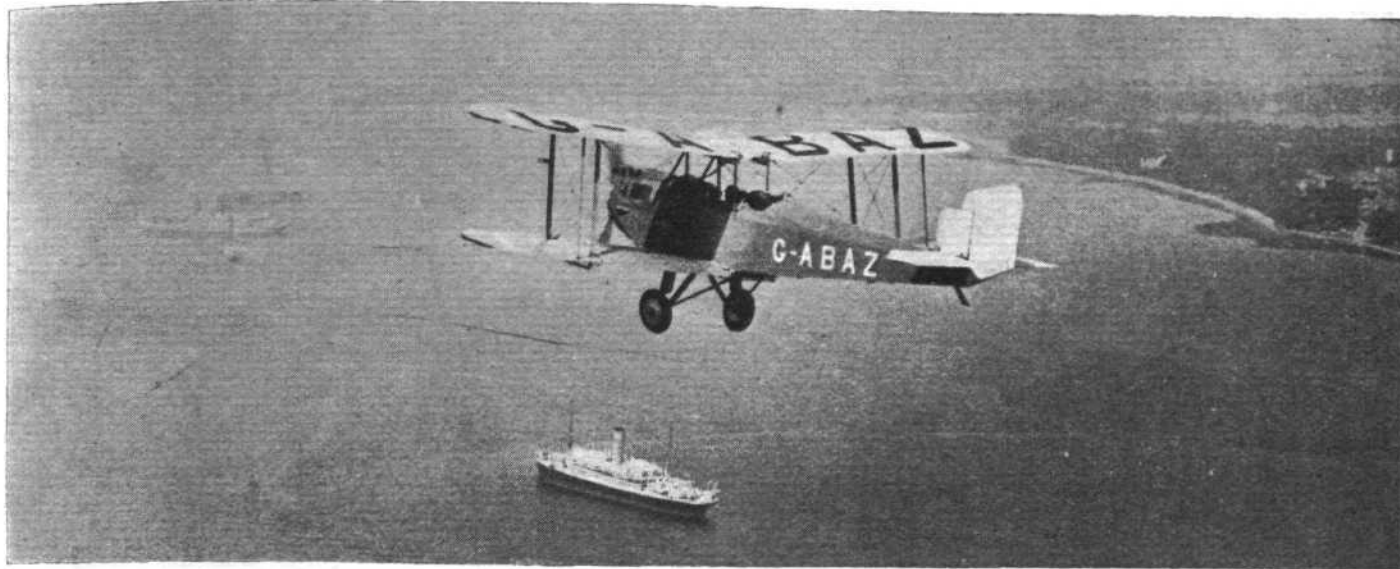
Southern Martlet. Genet Major engine.
Southern Martlet avec moteur Genet Major.
Southern Martlet, con motor Genet Major.

IL existe quatre modèles distincts de Southern "Martlet," pareils dans leur grandes lignes, mais munis de moteurs de types différents. Le premier mis sur le marché avait le "Hornet" A.B.C. Le deuxième a été muni d'un moteur Armstrong-Siddeley "Genet," le troisième d'un moteur De Havilland "Gipsy," et il a récemment été mis la dernière main à une machine munie du moteur "Genet Major" Armstrong-Siddeley.

Le Martlet est un avion léger monoplaza dont la performance est réellement stupéfiante. Cette machine est non seulement très rapide, possédant une capacité de montée supérieure avec un quelconque des types de moteurs mentionnés ci-dessus, mais sa facilité de manœuvre est tout aussi extraordinaire, lui permettant d'entreprendre des tours d'acrobatie aérienne de tous genres. Cet aéroplane, destiné principalement à l'usage de pilotes possédant déjà une expérience considérable, désirant s'entraîner à fond dans des manœuvres avancées, peut cependant être confié à des débutants, grâce à son exceptionnelle facilité de manœuvre.

HAY cuatro modelos distintos del Southern "Martlet," generalmente parecidos pero con motores diferentes. El primero que se construyó tenía el A.B.C. "Hornet." El segundo fué dotado del "Genet" de Armstrong Siddeley, y en el tercero se montó el "Gipsy" de De Havilland. Recientemente se ha terminado un aparato que lleva el motor "Genet Major" de Armstrong Siddeley.

El "Martlet" es un avión ligero monoplaza con un rendimiento asombroso. No sólo el aparato es velocísimo y tiene una velocidad de subida elevada con todos los cuatro tipos de motor, sino que es extraordinariamente manejable y capaz de toda clase de acrobacias. El aparato es destinado en primer lugar a ser conducido por pilotos experimentados, que desean ejercitarse en las maniobras difíciles, si bien el "Martlet" es muy fácil de conducir, aun por un piloto poco experimentado.



Spartan 3-seater flying above Southampton Water.

Triplace Spartan survolant la rade de Southampton.

Avión Spartan de tres asientos, volando sobre la rada de Southampton.

LORSQUE MR. O. E. SIMMONDS fonda la société Spartan Aircraft Limited, il le fit dans l'intention de se livrer à la construction d'appareils ayant cette caractéristique inusitée d'offrir la complète interchangeabilité des ailes, mâts et haubans d'aile, etc. C'est ainsi que le dessin des avions Spartan est conçu de telle sorte qu'une même aile de rechange puisse se monter dans n'importe laquelle des quatre positions que rend possibles la cellule d'un biplan.

Cette société a sorti plusieurs types d'appareils, dont nous citerons le triplace Spartan léger et le modèle "Arrow." Le triplace peut se livrer muni soit d'ailes d'un profil symétrique et offrant une parfaite interchangeabilité, soit du profil Clark Y et d'une interchangeabilité légèrement moindre. Le modèle "Arrow," dont les ailes sont du profil Clark Y, est un biplace permettant un excellent décollage et capable de monter rapidement.

Ces deux appareils, construits principalement en bois, peuvent se fournir munis au choix de groupes moto-propulseurs les plus divers, selon les exigences particulières de l'acquéreur.

CUANDO MR. O. E. SIMMONDS fundó la compañía Spartan Aircraft Limited, tenía en vista la producción de aparatos de aviación en los cuales la característica principal y dominante fuese la intercambiabilidad completa de las alas, los montantes de refuerzo de las alas, los cables de atirantamiento de las alas, etc. La construcción de los aparatos Spartan ha sido ideada en tal forma que una ala de reserva puede ser montada en cualquiera de las cuatro posiciones del armazón de un biplano.

Se producen varios tipos de aparatos de aviación de los cuales haremos mención del aeroplano de 3 plazas, de tipo ligero, y el aparato "Arrow." El avión de 3 plazas puede suministrarse ya sea con las alas de sección simétrica de plano e intercambiabilidad completa o bien de sección de plano Clark Y, y una intercambiabilidad algo menor. El aparato "Arrow" está dotado de la sección de plano Clark Y, siendo un avión de dos plazas dotado de un despegue excelente y una rápida relación de trepar.

Los dos aparatos son de construcción principalmente de madera y ambos se pueden obtener con una variedad de motores, de acuerdo con los requerimientos propios del comprador.

SPARTAN

SPARTAN AIRCRAFT, LIMITED,
WESTON, SOUTHAMPTON

MR. O. E. SIMMONDS founded the firm of Spartan Aircraft, Ltd., a few years ago, for the production of light aeroplanes which incorporated some very unusual features of interchangeability. By using a symmetrical wing section, Mr. Simmonds was able so to arrange the design that one spare wing could be used in any of the four positions on a biplane. A similar system was applied to tail surfaces, undercarriages, etc., which also had this ability to be used in more than one place. For instance, one half of the undercarriage was identical with the other half and could be used on either side. More recently, Mr. Simmonds has introduced another innovation in that he makes use of wing sections which are not symmetrical but yet retain to a large extent the interchangeability which was a feature of the earlier machines, although achieved in a slightly different way.

Among the types manufactured by Spartan Aircraft, Ltd., is the three-seater Spartan with "Cirrus Hermes" engine. This machine is a biplane, mainly of wood construction, and while the pilot occupies the rear cockpit in the normal way, the forward cockpit is arranged for two passengers. Moreover, the cockpit is so arranged that the two passengers can either sit both facing forward or facing each other. The Spartan can be supplied either with the symmetrical wing section and full interchangeability, or with wings of modified Clark Y section and slightly less extensive interchangeability.

A more recent model introduced is the Spartan "Arrow," which is a two-seater light aeroplane with wings of large span, so as to improve the take-off and climb. Like the 3-seater Spartan, the "Arrow" is mainly of wood construction, but is fitted as standard with the Clark Y aerofoil section and not with the symmetrical section.

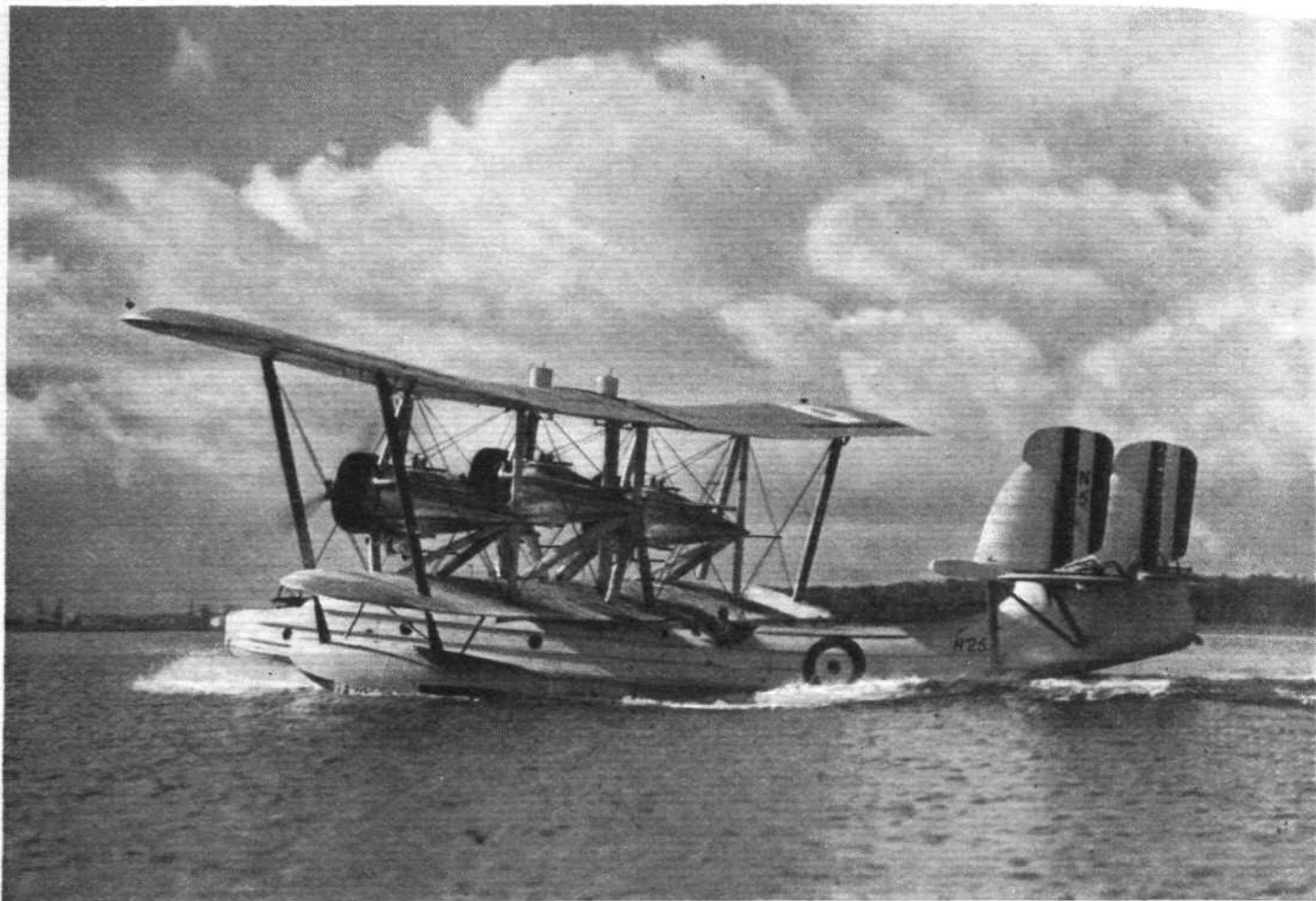
The "Arrow" is obtainable with various power plants, such as the "Gipsy I," "Gipsy II," and Cirrus "Hermes" or any other engine of approximately the same weight and power.



Spartan Arrow 2-seater Light aeroplane.

Biplace léger Spartan Arrow.

Aeroplano ligero Spartan Arrow de dos asientos.



SUPERMARINE

THE SUPERMARINE AVIATION WORKS, LTD.,

WORKS: WOOLSTON,
SOUTHAMPTON

LONDON OFFICE: VICKERS HOUSE,
BROADWAY, WESTMINSTER, S.W.1

THE Supermarine Aviation Works were founded in 1913 by Mr. Pemberton Billing, and for most of the period since then the firm has specialised in the production of marine aircraft of which a very large number of types have been produced from time to time, both Service and civil machines. It is likely that outside England the machines for which the firm are best known are the racing seaplanes designed and built for the various Schneider Trophy contests. It will be recollected that it was a Supermarine Type S.6 with Rolls-Royce racing engine which won the Schneider Trophy contest in 1929 and which later established a world's speed record by flying at an average speed over the 3-km. course, of 576 km./hr.

It speaks well for the versatility of the Supermarine designers that they were able to design such successful racing aircraft, in view of the fact that the "bread and butter products" of the firm have, for many years, been large flying-boats, which have been as successful in their way as was the Schneider Trophy racer.

The Supermarine "Southampton" is already well known to all readers of FLIGHT, as it has been in production for several years. At first the machine was built with wooden hulls, then a metal hull was substituted, and finally, the machine became constructed entirely of metal with the exception of the wing covering.

The latest version of the "Southampton" is the Mark X. This is a 3-engined military flying-boat fitted with three Armstrong-Siddeley "Panther" engines arranged in-line abreast in the gap between the wings. The machine being of recent construction and the property of the Air Ministry, no performance figures may be given of it, but it may be said that it has a span of 79 ft., length of 55 ft. 6 in., and a total wing area of 1,235 sq. ft.

The duralumin hull is of the two-step type, and the hull of the under-water boat is planked with stainless steel. Bulkheads extending to above the waterline divide the hull into a number of compartments. All fittings are of stainless steel. The wing floats, which are of normal Supermarine construction, are mounted close in to the hull.

The Armstrong-Siddeley "Panther" engines are, as already mentioned, mounted in the gap between the wings. They are faired in by monocoque nacelles, which also contain the oil tanks. The main fuel tanks are in the top centre section and give direct gravity feed to all three engines. Hand starting gear is provided and the engine mountings have been so arranged that it is possible to change engines while the machine is afloat.

In view of the military nature of the "Southampton X," but little may be

Supermarine Southampton X.

LA MAISON SUPERMARINE AVIATION WORKS fut fondée en 1914 par Mr. Pemberton-Billing. Pendant la guerre, Mr. Billing s'étant retiré, l'affaire fut reprise par le Commander J. Bird et Mr. Hubert Scott Paine. Le dernier céda sa part il y a quelques années, et, un peu plus tard, les établissements de la Supermarine finirent par passer sous l'égide du groupe Vickers. A l'heure actuelle, les ateliers de Southampton se consacrent exclusivement à la construction des avions marins, tandis que tous les appareils terrestres se fabriquent aux usines Vickers.

Les chantiers de la Supermarine Aviation Works, situés à Woolston, près de Southampton, ont sorti plusieurs grands monocoques d'une réalisation très heureuse, parmi lesquels le plus connu est probablement le "Southampton," appareil ayant fait l'objet de nombreuses livraisons non seulement à l'Aviation Royale de Grande Bretagne, pour opérations de patrouille côtière, mais aussi à différents états étrangers. Le "Southampton Mark X," variante la plus récente de ce type renommé, diffère de son prototype à plusieurs points de vue, notamment par la disposition des moteurs ainsi que par d'autres détails. Le "Southampton X" est conçu pour opérations de reconnaissance en pleine mer, et comporte trois moteurs Armstrong-Siddeley "Panther" à refroidissement par l'air. La coque est en duralumin, de même que les ailes dont celles du bas sont recouvertes de métal. La partie inférieure de la coque jusqu'à la ligne de flottaison, porte un revêtement en acier inoxydable.

Le Supermarine "Sea Hawk," Mark II, réplique du "Southampton X" pour l'aviation civile, est muni de moteurs identiques. Aménagé pour le transport des courriers et des voyageurs, il peut emporter 10 passagers

auxquels est assuré le plus grand confort. Il y est prévu deux compartiments pour sacs à dépêches, dont l'un à l'arrière et l'autre à l'avant de la cabine, de façon à pouvoir maintenir l'équilibre de l'appareil avec différents chargements postaux.

C'est aux ateliers Supermarine que se doit la construction, d'après leurs propres plans, de l'appareil S.6 qui, vainqueur de la Coupe Schneider en 1929, a établi un record mondial de vitesse à 576 km./h.

LA SOCIEDAD THE SUPERMARINE AVIATION WORKS fué fundada en el año 1914 por Mr. Pemberton Billing. Durante la gran guerra europea Mr. Billing se desasoció con la referida empresa, la cual fué adquirida por el Comandante J. Bird y Mr. Hubert Scott Paine. Algunos años atrás Mr. Scott Paine vendió los intereses que tenía en la firma y algo más tarde la empresa Supermarine entró a formar parte de la organización Vickers.

En su tiempo, las fábricas The Supermarine Aviation Works en Woolston, Southampton, han producido algunos hidroaviones de alta mar del tipo "flying boat" que han alcanzado gran éxito, entre los cuales el mejor conocido es quizás el "Southampton" que ha sido suministrado en gran número al Real Servicio Británico de Aviación para los fines de patrullas costaneras, así como también a diversos gobiernos extranjeros. El hidroavión "Southampton Mark X" constituye el modelo más reciente de este tipo famoso, alejándose de la construcción del tipo "Southampton" original en diversos sentidos, más especialmente por lo que se refiere a la disposición de sus motores aunque también en algunos otros detalles. El aparato "Southampton X" ha sido ideado para prestar servicios de reconocimiento aéreo en alta mar, y está provisto de tres motores "Panther" de Armstrong Siddeley, del tipo de enfriamiento por aire. La construcción del casco del bote es de duraluminio, así como también de las alas de las cuales la inferior está cubierta de metal. La parte inferior del casco del bote, hasta la línea de flotación, está revestida de acero inoxidable.

El aparato Supermarine "Sea Hawk" Mark II constituye la variación del hidroavión "Southampton X" que se destina a prestar

said concerning its equipment. In the nose of the hull there is a cockpit for a gunner equipped with Lewis gun on a sliding mounting. The cockpit has a sliding cover for use when the machine is taking off or alighting. Two pilots are seated side by side and with dual controls in a cockpit just ahead of the wings. This cockpit is provided with a detachable cabinet top. The compartments for wireless operator and navigator are in the main hull behind the cockpit and further aft are bunks for the entire crew, as the machine is completely equipped to enable the crew to live on board. Behind the wings are two gun positions, staggered in relation to each other, while yet another gun position is in the extreme tail behind the elevator.

The Supermarine "Sea Hawk," Mark II.—This machine is in effect the civilian version of the "Southampton Mark X." It is an all-metal 3-engined flying-boat and like the "Southampton X" is fitted with Armstrong-Siddeley "Panther" engines. The wings are of biplane form with the top plane of greater span than the bottom, and the wing tip floats are mounted closer to the hull than is usual. The petrol tanks are carried in the top plane, giving simple gravity feed.

The flying-boat hull is mainly of duralumin construction, but the fairings are of stainless steel, as is also the planking of the under-water portion.

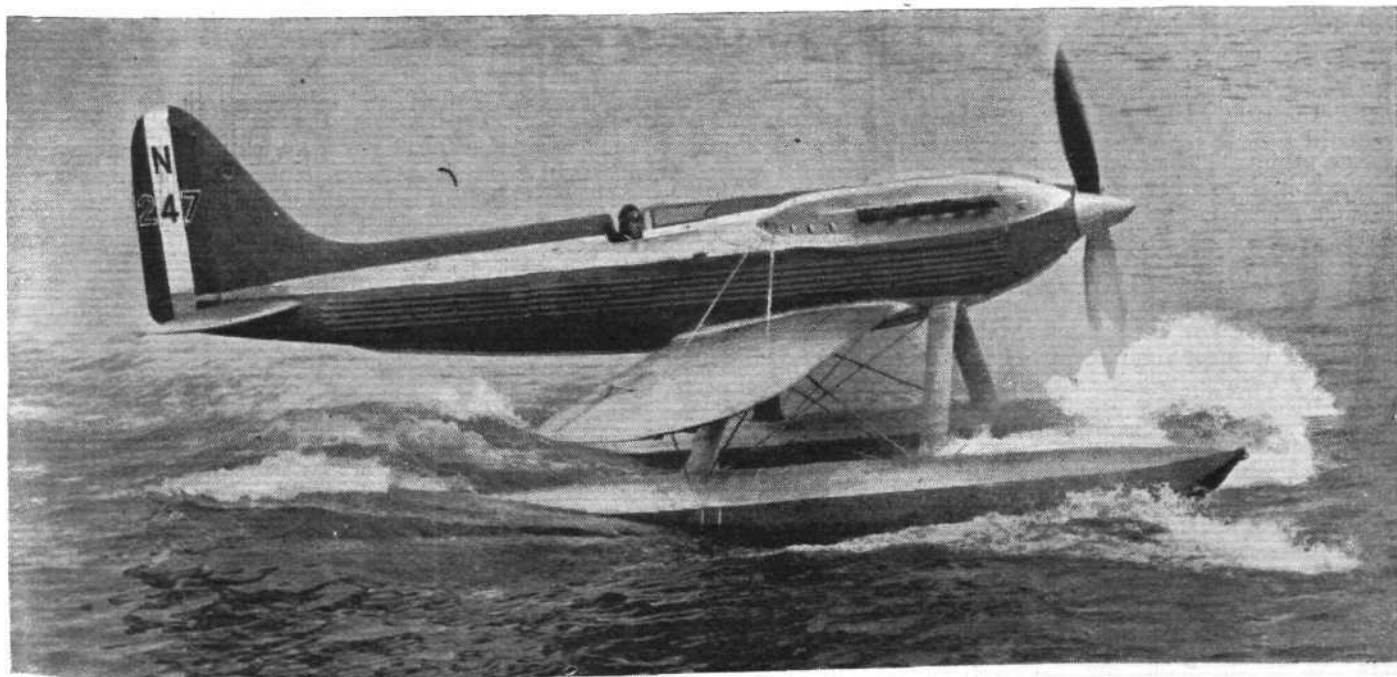
In the bows there is a cockpit for use when mooring, etc., and all the marine equipment is stowed here. Aft of this the two pilots are seated, side by side in an enclosed cabin. As the seats are placed high up in the hull and close to the sides, both pilots have an excellent view forward and downward. Behind the cockpit come the compartments for the wireless operator and for the navigator, with ample table room, shelves and lockers. Behind the wireless compartment, on the port side, is accommodation for approximately 50 per cent. of the mails, the rest of the mails being in another compartment aft of the cabin, so that the trim of the machine may be maintained by a suitable disposal of the mails in the two compartments.

The main passenger cabin has seating accommodation for ten passengers, and special attention has been paid to comfort, lighting and ventilation. The capacity of the cabins, mail and luggage accommodation, is in accordance with the requirements of Imperial Airways, Ltd., and are based on their long experience. The passengers enter the cabin through a hatch in the side of the hull. There is a lavatory at the after end of the saloon and luggage is carried in a compartment adjoining the aft mail compartment.

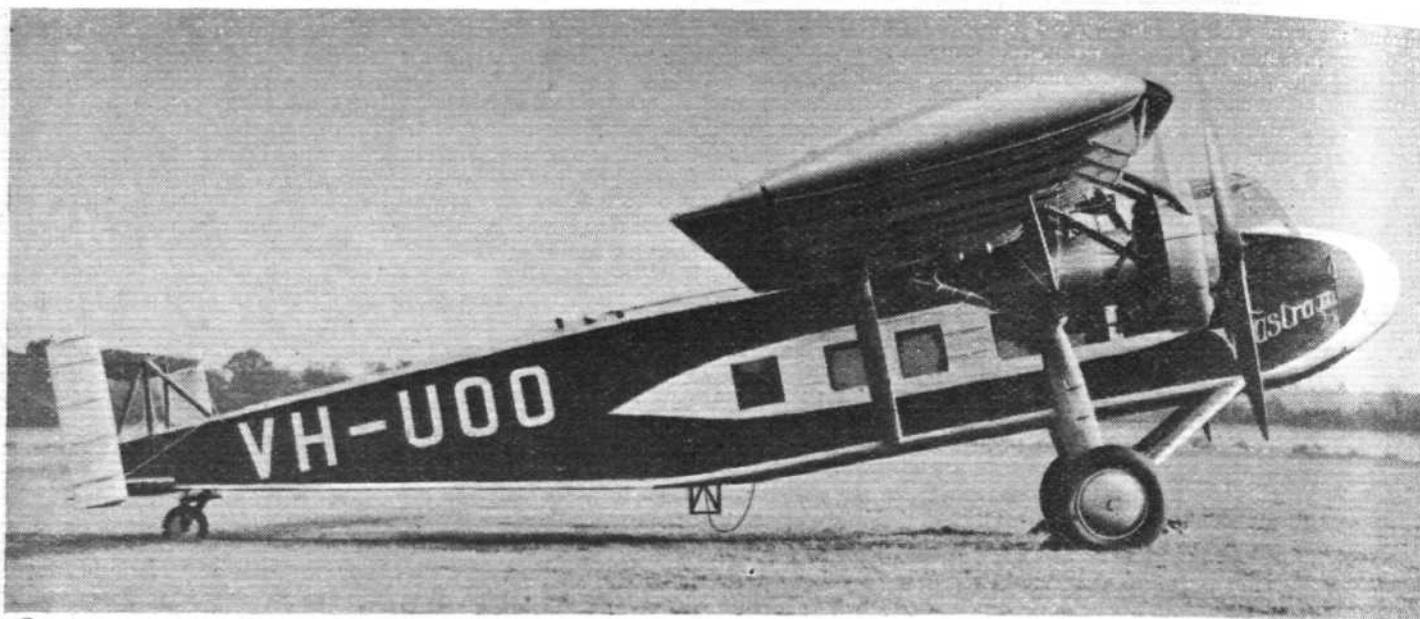
The latest type to be designed by the Supermarine Aviation Works is a large six-engined monoplane flying-boat, which will be by far the largest ever constructed in Great Britain, although not as large as the Dornier Do.X in the matter of weight. The new Supermarine will be fitted with six Rolls-Royce "H" engines and will carry a crew of seven and 40 passengers for day journeys, or 20 passengers sleeping. The new machine will have a fuel capacity sufficient for 12 hours' flying at cruising speed. Some idea of the size of the new machine may be formed from the fact that the span will be about 165 ft., while the wing area will be about 3,400 sq. ft. The hull will have stainless steel frames and the under-water boat will be planked with stainless steel, while duralumin will be used for the rest of the covering.

servicios comerciales y está dotado de los mismos motores. Ha sido ideado para el transporte de pasajeros y de correos, y cuenta con el alojamiento necesario para 10 pasajeros con la mayor comodidad.

El hidroavión Supermarine S.6 que ganó el Trofeo Schneider en el concurso de 1929 y que estableció un record mundial de velocidad de 576 kilómetros por hora, fué diseñado y construido en las fábricas Supermarine.



Supermarine S.6, Rolls-Royce engine, which won Schneider Trophy Contest and established world speed record of 357.7 m.p.h.
Supermarine S.6 à moteur Rolls-Royce, qui a gagné la coupe Schneider et porté le record mondial de la vitesse à 576 kilomètres à l'heure.
Supermarine S.6, motor Rolls-Royce, ganador del Trofeo Schneider, que estableció el record mundial de velocidad de 576 kilómetros por hora.



VICKERS

VICKERS (AVIATION), LIMITED,

WORKS: BYFLEET ROAD,
WEYBRIDGE, SURREY

LONDON OFFICE: VICKERS HOUSE,
BROADWAY, WESTMINSTER, S.W.1

VICKERS, LTD., some time ago, secured a controlling interest in the Supermarine Aviation Works, Ltd., but the two designing staffs are almost entirely independent, although naturally the very closest liaison is maintained, and the design staff of one firm assists the other with information and advice. As the Supermarine engineers have for many years specialised in marine aircraft, it is natural that, when an aircraft of this type is to be produced, the work falls to the Southampton works. When a landplane is planned, it is the Weybridge design office which tackles it. This division of the work is not, it should be pointed out, an entirely unalterable procedure, but in a general way it represents the policy followed. Something depends upon the amount of work in hand at the two works at a given time. For example, when the first "Viastras" were being built it so happened that the Weybridge works were very busy on the production of military aircraft. Consequently the "Viastras" were built at Southampton. But in a general way it is true to say that marine aircraft work is done by Supermarines and landplane work by Vickers. The chief designer of Vickers is Mr. Rex Pierson, and at Supermarines Mr. R. J. Mitchell is chief designer and engineer.

Out of the very large number of types produced by Vickers, Ltd., in recent years we have space to deal with but a very few here. Those to which reference will be made are the "Viastra" and "Vellore" commercial machines, and the "Vespa" and "Vildebeest" military types.

The "Viastra" is an all-metal monoplane, the metal construction including the covering of wing and fuselage. It is a most remarkable machine in that it has been so designed that it can be used as a single-engined, twin-engined or three-engined machine. Rather remarkably, the difference in useful load carried by the machine in the three forms is relatively small. This is due to the fact that, to take the two extremes, for example, when three engines are fitted the wing loading is somewhat increased, while the power loading is reduced. When a single engine is used, the wing loading is reduced, while the power loading is increased. This feature of choice of power plants and their number is a great advantage, and should make the machine suitable for almost any conceivable operating conditions. For example, on a route where landing grounds are numerous and frequent, and where no great altitudes have to be attained, it would be feasible to use the machine as a single-engined type, with very good operational economy. Conversely, on routes where forced landings must be avoided at all costs, the operating company would choose the three-engined model.

Three "Viastras" have been built recently to the order of West Australian Airways, Ltd., of which two are twin-engined machines and the third a single-engined. A three-engined "Viastra" was also completed and flown recently. This machine was fitted with three Armstrong-Siddeley "Lynx" engines.

The "Viastra" is a high-wing strut-braced monoplane of all-metal, mainly duralumin, construction. Apart from its multiple engine arrangement, the machine is unusual in that the covering of wing and fuselage is part of the stress-bearing structure. In the fuselage construction use is largely made of angle sections of duralumin, which form the longerons, stringers and struts. These members have the strength necessary to support the loads imposed upon them, but lack the necessary stiffness, which is supplied by the metal covering. This is in the form of duralumin sheet, corrugated in a fore-and-aft direction, the corrugations thus crossing the vertical and diagonal struts at large angles.

The cabin walls are similarly planked, and in order to prevent drumming small squares of fabric filled with sand are riveted to the duralumin sheet

Vickers Viastra passenger carrier. (Two Bristol Jupiters.)
Vickers Viastra, avion à voyageurs (deux moteurs Bristol Jupiter).
Vickers Viastra, avión para el transportes de pasajeros (2 motores Bristol Jupiter).

VICKERS (AVIATION), LTD., possède actuellement une participation prépondérante dans les établissements Supermarine Aviation, et généralement le plan d'exploitation consiste à faire construire tous les avions marins par la société Supermarine aux usines de Southampton, tandis que tous les avions terrestres sont étudiés et construits aux ateliers Vickers situés à Weybridge.

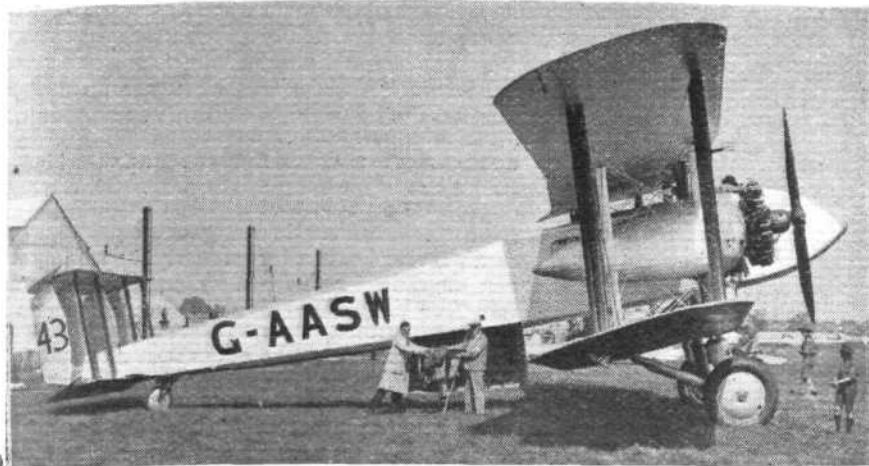
Des nombreux types d'avions produits par Vickers nous ne pouvons mentionner ici que quelques-uns. Ce sont les avions commerciaux "Viastra" et "Vellore," et les appareils militaires "Vespa" et "Vildebeest."

Le Vickers "Viastra" est le premier avion du monde qui ait été étudié non seulement pour pouvoir être équipé de moteurs de marques diverses, mais aussi pour pouvoir utiliser diversement ces moteurs comme appareil à un seul, à deux ou à trois moteurs. La performance varie considérablement suivant la puissance et le nombre des moteurs, mais il est surprenant de voir combien peu est affectée la charge utile.

West Australian Airways a fait construire trois appareils "Viastra": un monomoteur et deux bimoteurs. Dans toutes ses formes le "Viastra" est un monoplan tout métal, dont le fuselage et les ailes sont revêtus de duralumin fixé de manière à participer aux efforts de la membrure. Il en résulte une structure très rigide, et le travail d'entretien des appareils en service se réduit à peu de chose. Cet appareil peut recevoir 12 passagers à son bord.

Le "Vellore" est un développement de l'appareil de même nom qui se construisait il y a quelques années; c'est un avion porte-fret à grande vitesse. Le premier appareil de ce nom avait un seul moteur; mais, pour répondre aux exigences modernes, le nouveau type en a deux (moteurs "Jupiter" démultipliés). Le "Vellore" est un biplan de construction entièrement métallique, mais au contraire du "Viastra" ses ailes sont recouvertes de toile. Le fuselage est très spacieux et l'appareil est capable de transporter des marchandises non seulement lourdes mais aussi encombrantes.

Le "Vildebeest" est un biplan entièrement métallique destiné aux fonctions de torpilleur et de bombardier. Le prototype est muni d'un moteur Bristol "Jupiter," mais un second appareil de la série est équipé du moteur Armstrong-Siddeley "Panther,"



Vickers Vellore high-speed freight carrier.
Vickers Vellore, avion à grande vitesse pour le transport de marchandises.
Vickers Vellore, avión de gran velocidad, para el transporte de carga.

qui développe 545 CV. Avec l'un ou l'autre moteur, le poids brut de l'appareil est de 3.610 kgs.

Le Vickers "Vespa" est, comme le "Vildebeest," de construction entièrement métallique (duralumin) avec revêtement en toile. C'est un biplan étudié pour le service de coopération avec l'armée, et il est remarquable par son excellent envol et son grand pouvoir ascensionnel. Ces caractéristiques ont été particulièrement utiles en Bolivie, pays au gouvernement duquel Vickers a fourni un certain nombre de Vespa, car les aérodromes boliviens auxquels se rattachent les opérations de ces appareils sont situés à une altitude d'environ 4.000 mètres.

EN la actualidad la casa Vickers (Aviation), Ltd. posee la mayoría de las acciones de la empresa Supermarine Aviation Works y el modo de proceder es, hablando de una manera general, que la empresa Supermarine se ocupe de la construcción de todos los aparatos marinos en los talleres de Southampton, mientras que todos los aeroplanos terrestres se diseñan y construyen en los talleres de Vickers, en Weybridge.

De los numerosos tipos de aparatos de aviación producidos por la casa Vickers, el espacio limitado que disponemos en estas páginas tan sólo nos permite tratar con unos cuantos de ellos. Entre estos podemos mencionar los aviones comerciales "Viastra" y "Vellore," y los tipos militares "Vespa" y "Vildebeest."

El tipo Vickers "Viastra" constituye el primer aparato en el mundo que ha sido diseñado no solamente para admitir una variedad de motores, sino que también para emplearlos en formas diversas, es decir, como aparatos de aviación de un solo motor, de dos motores o de tres motores. Como es natural, la *performance* tiene forzosamente que variar de manera considerable de acuerdo con la potencia y el número de motores, pero es sorprendente lo poco que queda afectada la carga útil.

Se han construido tres aparatos "Viastra" contra pedido de la empresa West Australian Airways, uno de ellos dotado de un solo motor y los otros dos provistos de motores gemelos. En todas sus formas el modelo "Viastra" es un monoplano de construcción enteramente metálica, con el fuselaje y las alas recubiertos de duraluminio el cual está dispuesto de tal modo que forma parte de la estructura que debe soportar los esfuerzos. De aquí resulta que se obtiene una estructura muy rígida, dando lugar a muy poco trabajo de entretenimiento para los aparatos en servicio. Este modelo dispone del alojamiento necesario para 12 pasajeros.

at fairly close intervals. The cabin equipment depends upon the particular use to which the machine is to be put.

In the wing structure some unusual features are to be found. The monoplane wing has two main spars of usual Vickers type, i.e., with flanges of sheet duralumin, laminated up to the required thickness at any given point. The spar web is of the zig-zag type, which runs alternately from front to rear face of the spar. This type of spar construction has the advantage that no diaphragms are required, while the construction is very simple and cheap, and yet of good structural efficiency in the matter of ratio of strength to weight.

The wings have plain duralumin sheet flanges, the flanges being placed "on edge," and braced by tubular ties. The sheet duralumin wing covering is bent up at right angles in a plane parallel with the chord, the bent-up ends of each panel being riveted to the rib flanges. The divided undercarriage is strut braced to the wing struts

and to the fuselage. The wide wheel track makes the machine stable on the ground, and as Vickers hydraulic wheel brakes are fitted, the machine can be manoeuvred in a very small space while taxiing.

In its twin-engined form the "Viastra" may be fitted either with Bristol "Jupiter" or Armstrong-Siddeley "Jaguar" engines. Two of the photographs show the machine with these two alternative power plants. When the fuselage engine is not fitted, a slightly different "nose" is put on the fuselage, as shown in the photographs, and the view from the pilot's cockpit is then even better than in the three-engined version.

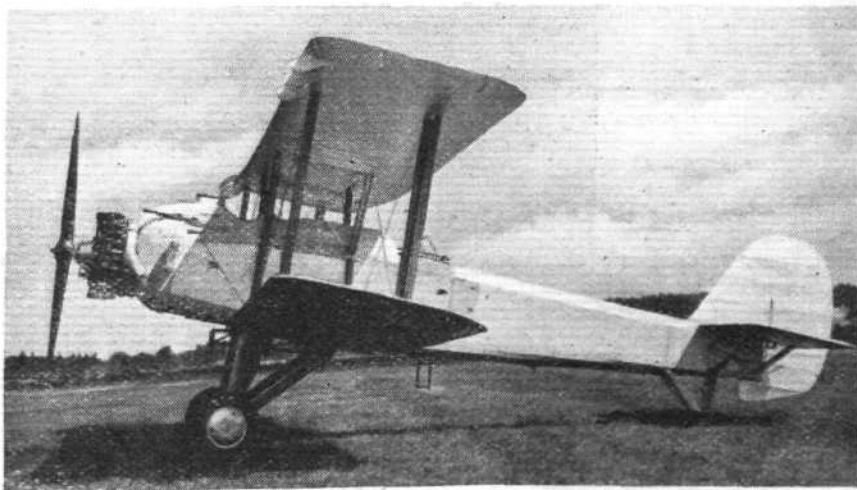
The Vickers "Vellore II" is a twin-engined, fast freight carrier. It is a development of the "Vellore I" produced some years ago, but is fitted with two outboard engines in place of the single engine in the fuselage of the first machine.

In general construction the "Vellore II" is rather similar to the "Viastra" as regards the fuselage. The wing structure is different, not only because of the biplane wings, but also because metal covering is not used, the "Vellore" wings being fabric covered. This only means that the ribs are of slightly different construction. The spars are of the same type.

The "Vellore II" has been designed and built expressly for use on services organised for the rapid transport of goods and mails, and is thus at considerable advantage as compared with a machine originally designed as a passenger carrier, but converted for carrying both freight and passengers. It is the first machine to be built exclusively as an "aerial freighter," and the efficiency of the "Vellore I" is reflected in the modern twin-engined version.

The enclosed cabin is of large dimensions, and if the machine is to be used to carry both passengers and mails seating accommodation can be provided for eight passengers, while a subsidiary luggage compartment of 17 cu. ft. capacity gives ample space for any luggage likely to be carried. Blocks and tackle are provided for handling freight and cargo, loading and unloading being carried out through a specially designed door in the fuselage aft of the wings.

The wings of the "Vellore II" are designed to fold, so that the hangar space required is not large in proportion to the size of the machine. The undercarriage is of the divided type, and of very wide track, the wheels being situated immediately below the wing engines. The wheels are provided with Vickers patent hydraulic brakes, which can be operated together or separately, so that not only can the machine be pulled up in a very short space, but also can be manoeuvred in very confined spaces.



Vickers Vildebeest torpedo-plane and bomber.
Vickers Vildebeest, avion torpilleur et de bombardement.
Vickers Vildebeest, avión para lanzamiento de torpedos y bombardeo.



Vickers Viastra passenger carrier. Two Jaguars.
Vickers Viastra, avion à voyageurs (deux moteurs Jaguar).
Vickers Viastra, avión para pasajeros (dos motores Jaguar).

With a maximum speed of 138 m.p.h. and a cruising speed of 120 m.p.h., the "Vellore II" should prove an extremely serviceable type for the rapid transport of freight, the value of which is such as to justify the slightly heavier cost of transport.

The Vickers "Vespa" is an all-metal Army Co-operation biplane, fitted with Armstrong Siddeley geared "Jaguar" engine. In its aerodynamic design the machine is characterised by wings of large span and gap, while the fuselage is long and slim and placed high in the gap, i.e., the lower wing runs right through underneath the fuselage and is not attached direct to the lower longerons, as is more usually done.

A number of "Vespa" machines have been sold to Bolivia, where the operational conditions are somewhat difficult on account of the fact that the aerodrome is situated at an altitude of about 14,000 ft.

The fuselage of the "Vespa" has longerons and struts of duralumin tube, while bracing is by high-tensile steel tie-rods. The covering is fabric. The biplane wings are of usual Vickers construction, with spars of the "wandering web" type and ribs built up of duralumin.

The Armstrong Siddeley "Jaguar" engine is fitted with a Townsend ring to reduce drag. The fuel is carried in the top wings, so that supply to the engine is by direct gravity feed.

Owing to the high placing of the fuselage in the wing gap, and the cut-out centre section, both pilot and observer have a very good view. The observer's gun wing is so placed that excellent screening is attained at top speed, so that the gunner is able to fire with greater precision than is usual from high-speed machines. The maximum speed near the ground is 146 m.p.h., while at 14,760 ft. the speed is 130 m.p.h. The climb to 14,760 ft. occupies 15.8 minutes.

The Vickers "Vildebeest" is a torpedo-carrying and bombing land-plane, with open cockpits for pilot and observer. The machine is of all-metal construction, duralumin being the main structural material. The prototype of this machine was fitted with the Bristol "Jupiter X.F.," while a second development aircraft has been fitted with the Armstrong Siddeley "Panther." With either engine the gross weight of the machine is 7,955 lb. No performance figures are available.

The "Vildebeest" can also be supplied as a twin-float seaplane.

El tipo "Vellore" es el desarrollo de la máquina del mismo nombre que se produjo algunos años atrás, y constituye un aparato de transporte aéreo de fletes de gran velocidad. El primer aparato de esta categoría estaba dotado de un solo motor pero el tipo nuevo, a fin de satisfacer las exigencias modernas, está provisto de dos motores (tipo "Jupiter" con engranaje reductor). El aparato "Vellore" es un biplano de construcción enteramente metálica pero, diferenciándose del modelo "Viastra," las alas están recubiertas de tela. El fuselaje es muy espacioso y el aparato es capaz de transportar fletes no solamente de gran peso sino que también de grandes dimensiones.

El aparato "Vildebeest" es un biplano de construcción enteramente metálica que se ha ideado para prestar servicio como avión de bombardeo y lanza-torpedos. El aparato prototipo está dotado de un motor Bristol "Jupiter," pero otra máquina de la misma categoría está provista de un motor "Panther" de Armstrong Siddeley, el cual desarrolla una potencia de 545 CV. al freno. Provisto de uno u otro de los antedichos motores, el peso neto es de 3.610 kilogramos.

Lo mismo como el "Vildebeest," el aparato de aviación Vickers "Vespa" es de construcción enteramente metálica (duraluminio), con revestimiento de tela. Este es un biplano que se ha ideado para prestar servicio de cooperación con el ejército, siendo sus características especiales su despegue excelente y rápida relación de trepar. Este tipo ha resultado de suma utilidad en el caso de Bolivia, a cuyo Gobierno la casa Vickers ha efectuado la entrega de varios aviones "Vespa." El aeródromo en Bolivia que sirve de estación aérea para los referidos aparatos está situado a una altitud de unos 4.000 metros.



Vickers Vespa Army Co-operation biplane.

Vickers Vespa, biplan de
coordination militaire.

Vickers Vespa, biplano para
cooperación militar.



Le nom "Wapiti" a puissamment contribué à faire la haute réputation des établissements "Westland Aircraft Works." La machine qui le porte, mise sur le marché il y a quelques deux ans, a remporté de tels succès qu'il en a été construit plus de 350 jusqu'à ce jour. Elle est en usage, non seulement dans l'Aviation Militaire Britannique, mais encore par les autorités sud-africaines et australiennes. La machine de série, construite toute en métal, constitue un aéroplane à usages généraux, dont il existe cependant des modèles militaires auxiliaires et des types hydroplan à flotteurs jumelés. Le "Wapiti" a été étudié pour montage de moteurs radiaux à refroidissement d'air, le plus fréquemment des types "Jupiter" et "Jaguar." Le fuselage est principalement en duralumin, et les ailes sont en acier.

Les "Établissements Westland" ont produit, il y a quelque temps, un type expérimental très intéressant, due type avion de chasse ou de combat d'interception, de construction entièrement métallique, de modèle monoplan à ailes surbaissées. Cet avion est muni d'un moteur "Mercury" Bristol; il possède une vitesse de montée remarquablement élevée, et une haute vitesse aux grandes altitudes.

Au cours de cette année les Établissements Westland se sont occupés de la production, outre de leurs "Wapitis," d'une machine à usages commerciaux extrêmement réussie appelée "Wessex," de modèle monoplan à trois moteurs, et à six places, munie de moteurs "Genet Major" Armstrong-Siddeley.

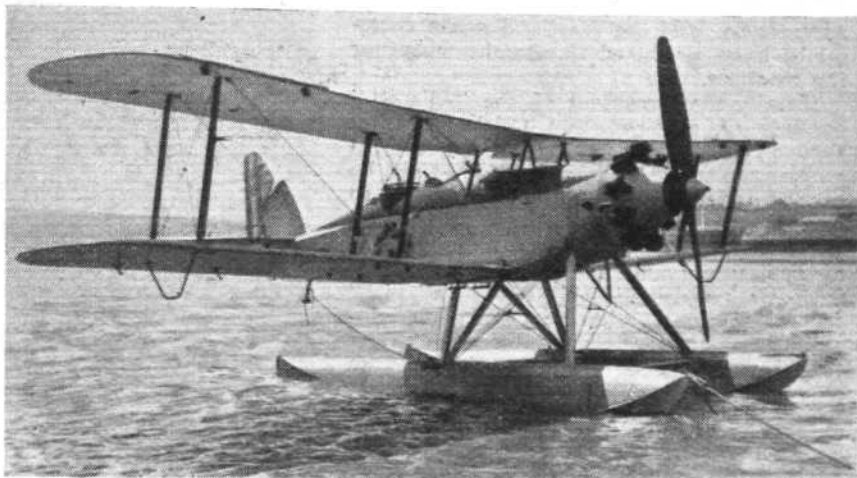
Le "Wessex" est de construction mixte, c'est-à-dire partiellement en bois et en acier. Ses ailes sont en bois, de même que la partie antérieure du fuselage, tandis que la partie postérieure de ce dernier est métallique.

Les moteurs de bâbord et tribord sont à niveaux très bas, empêchant le vent des hélices de frapper les plans. Les moteurs ne sont pas portés par les ailes, conformément au dispositif habituel, mais par des poutres de raccordement en tubes d'acier reliées au fuselage.

Il est prévu, sur les roues d'atterrissage, des freins permettant l'arrêt de la machine à peu de distance de son point d'atterrissage.

Le "Wessex" est, normalement, affecté au transport de voyageurs, et plusieurs de ces machines ont déjà été fournies récemment à la ligne aérienne belge "Sabena." Les accessoires requis pour le transport de passagers tels que les sièges, etc., peuvent cependant être enlevés, de manière à transformer le "Wessex" en machine éminemment appropriée au transport de marchandises, à haut rendement de chargement utile, et capable d'être exploité avec de très réelles économies.

Signalons un appareil expérimental très intéressant, le "Pterodactyl" de Westland-Hill. Cet appareil, étudié et construit par le Capitaine G. T. R. Hill, se distingue princi-



Avion marin Westland Wapiti.

Westland Wapiti seaplane.

Hidroplano Westland Wapiti.

WESTLAND

WESTLAND AIRCRAFT WORKS,

YEOVIL, SOMERSET

THE Westland Aircraft Works are a branch of the famous old firm of Petters, Ltd., of Yeovil, Somerset. Founded during the war, the firm, unlike so many others, has remained in the aircraft industry, and has gradually built up a very extensive business until at the present time the works at Yeovil are among the busiest in the country. Civil as well as military aircraft types are produced, and the type of machine which has chiefly made the Westland name famous in recent years is the "Wapiti," a general-purpose aircraft which has been built in very large numbers (more than 350) and is in use not only in Great Britain, but also in Australia and South Africa. The latter two countries adopted the "Wapiti" entirely on the strength of the reputation which the machine enjoyed in the Mother country. The popularity of the "Wapiti" is due, in the first place, to the excellent performance of the machine, even when it is carrying very heavy loads, but is also to a not inconsiderable extent due to the adoption by the Westland works of very simple forms of construction which lend themselves to rapid production, with consequent low price.

The "Wapiti" is an all-metal biplane fitted with radial air-cooled engine (Bristol "Jupiter" or Armstrong-Siddeley "Jaguar"), of normal British design as regards its general lines. In its standard form the machine is a general purpose aircraft, but it can also be supplied in a slightly modified form as an Army co-operation biplane. In the latter form the "Wapiti" has a lengthened fuselage and a rudder of different chord, while the undercarriage is fitted with brakes and a tail wheel is used instead of the tail skid. The machine can also be supplied as a twin-float seaplane, and with a ski undercarriage for work on snow. A machine so fitted is now in Canada. The three types of undercarriage are interchangeable in a few hours.

The fuselage of the "Wapiti" is built in three sections: the front section includes the engine plate and first bay, the second section from the front bay to aft of the pilot's cockpit, and the third section from the pilot's cockpit to the stern-post. All three fuselage sections are built up of tube of square section with rounded corners. The most heavily stressed fuselage members are of square steel tube, while the rest are of duralumin of the same section. Joints between longerons and fuselage struts are made by flat fish-plates and hollow steel rivets, this type of joint being rapidly made and assembled. In addition, the hollow steel rivets are considerably lighter than solid bolts and nuts. The strut ends do not bed down on the longerons, the tubular rivets being designed to take the bearing loads.

The engine plate is mounted on the front bay of the fuselage by square-section steel struts, and the engine mounting is devoid of bracing wires. The main petrol tank is carried in the fuselage, approximately on the centre of gravity. A gravity tank is placed in the deck fairing. The main petrol tank can be removed through the bottom of the fuselage.

The undercarriage is of the oleo-pneumatic type, and alternative to the standard straight axle a divided type can be fitted, or else a straight-axle type with wheel brakes.

The wings of the "Wapiti" are of all-metal construction, steel being the material chiefly used. Large numbers of wings have been built for "Wapitis" by the Gloster



Westland Wessex small commercial aeroplane.
Petit avion commercial Westland Wessex.
Westland Wessex, aeroplano comercial pequeño.

Aircraft Co., and the Westland works themselves have produced duralumin wings for the machine.

Usually the armament of the "Wapiti" consists of a fixed gun (Vickers) firing through the propeller and a Lewis gun on a gun-ring in the rear cockpit. Bombs can be carried under the wings and coupled up to the releases in the fuselage. The total weight of bombs which can be carried is approximately 500 lb.

Special provision is made in the "Wapiti" for the stowage of additional fuel and equipment necessary for long-distance and desert patrol work. This equipment includes an auxiliary fuel tank of 23 gallons capacity, spare wheel with tyre, drinking-water tank, necessary engine tools, and other special equipment.

The two cockpits are so placed in relation to the wings that the view is good from both of them. In the gunner's cockpit there is a tip-up seat which, when folded up, is out of the way and allows the gunner to assume a prone position on the floor for bombing.

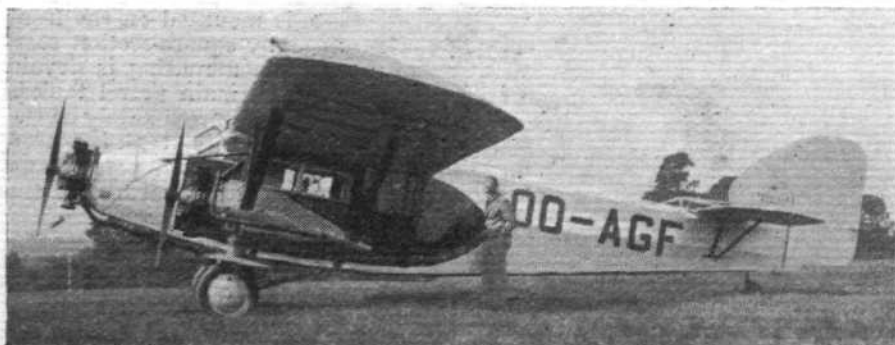
Performance figures, etc., of the "Wapiti" are given on p. 1320.

The Westland Interception Fighter is an all-metal low-wing monoplane fitted with Bristol "Mercury" engine. The armament consists of two Vickers guns firing forward through the propeller. Oxygen apparatus is fitted for use at great altitudes.

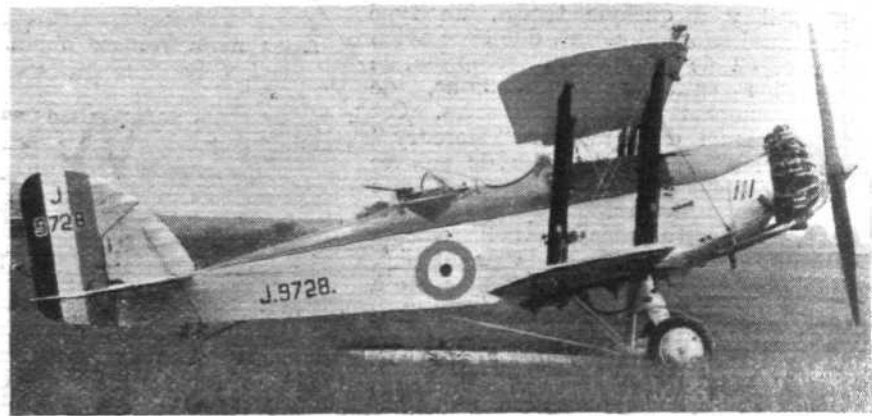
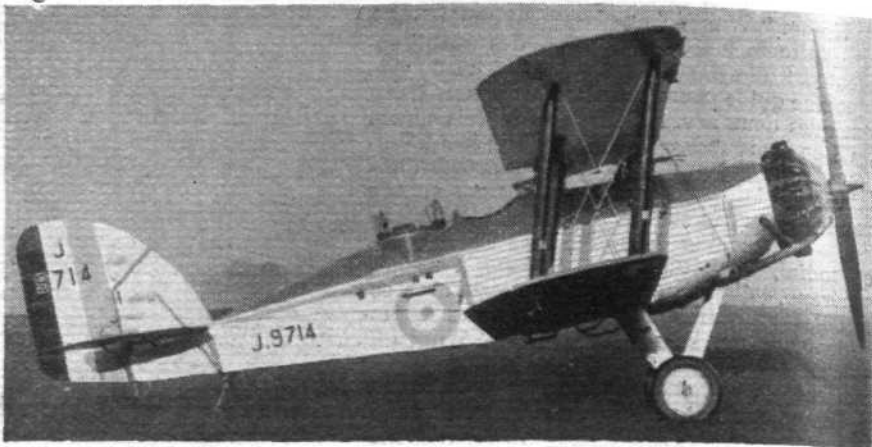
The Interception Fighter is, as the title implies, a machine designed to intercept attacks by air, and one of the main requirements is a very high rate of climb to enable the machine to reach the altitude of the raider in a minimum of time. No performance figures may be published, but the Westland Interceptor has a very remarkable climb.

Of commercial types produced by the Westland Aircraft Works, recently, may be mentioned here the "Wessex," which is a small three-engined commercial aeroplane fitted with three Armstrong-Siddeley "Genet Major" engines. This machine, of which several have been delivered recently to the Belgian S.A.B.E.N.A. Company, is of mixed construction, the designers using wood where it seems to them to be a better material for a specific purpose, and metal where the greater stresses are concentrated. The result has been a machine with a very good ratio of loaded weight to empty weight. The machine is a strut-braced, semi-cantilever monoplane of the high-wing type, which affords the passengers an excellent view in all directions that matter. The power reserve afforded by the three "Jaguar Major" engines is such as to enable the machine to maintain its height at 4,000 ft. on any two engines. The "Wessex" is supplied in two versions: as a passenger machine and as a freight or goods carrier. When the machine is used for carrying passengers, the accommodation is four or six passengers, according to whether or not the lavatory compartment is dispensed with. In either case, there is a spare seat next to the pilot, which can be occupied either by a second pilot and navigator, or by an extra passenger.

The fuselage consists of three main portions, of which the cabin forms the central portion, the forward portion carrying the engine and accommodating the pilot. The rear portion extends from the rear wall of the cabin to the stern post of the fuselage. The forward portion of the fuselage is of composite construction. The cabin portion is of wood construction, and the rear portion of metal construction, with square section duralumin longerons and struts.



Westland Wessex built for Belgian air lines.
Avion Westland Wessex construit pour lignes aériennes belges.
Avión Westland Wessex, construido para empresas belgas de navegación aérea.



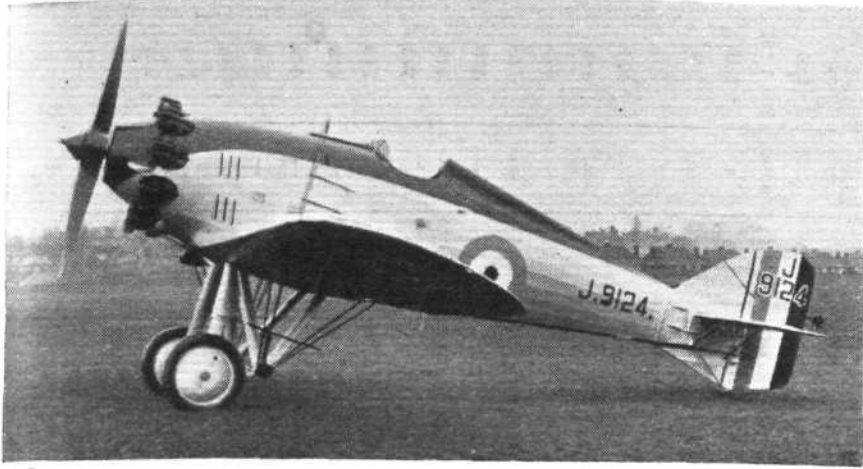
Above: Westland Wapiti general purpose machine. Below: Westland Wapiti Army Co-operation machine.
En haut: Westland Wapiti, pour utilisations générales. En bas: Westland Wapiti, pour coordination militaire.
Arriba: Westland Wapiti, para usos generales. Abajo: Westland Wapiti, para cooperación militar.

palement par le fait qu'il est complètement dépourvu de queue, et que les fonctions de cette partie d'un avion de type ordinaire sont effectuées par les surfaces de bout d'aile. Cela est rendu possible par l'agencement des ais inclinées vers l'arrière sous un angle très prononcé. Une des caractéristiques du "Pterodactyl" est qu'il est incapable de perdre sa vitesse en vol de la manière ordinaire.

EL nombre que mayormente ha hecho famosa a la Fábrica de Aviones Westland es "Wapiti." Este aparato fué producido primeramente hace unos dos años, y tuvo inmediatamente un éxito tal, que hasta ahora se han construido más de 350 de ellos. No sólo se usa en el Servicio Militar Británico de Aviación, sino también en los del África del Sur y de Australia. El aparato normal, todo de metal, es un avión para usos generales, pero se produce también el "Wapiti" bajo la doble forma de avión de cooperación con el ejército e hidroavión con dos flotadores. El "Wapiti" fué proyectado para ser propulsado por motores radiales de enfriamiento por aire, y los tipos que con más frecuencia se emplean son el "Jupiter" y el "Jaguar." El fuselaje está construido en su mayor parte de duraluminio, y las alas de acero.

Hace algun tiempo se produjo en las fábricas Westland un tipo experimental muy interesante. Este es del tipo interceptor de combate, y es un monoplano de alas bajas y de construcción enteramente metálica. El motor es un "Mercury" de la casa Bristol y el aparato tiene una velocidad de subida notabilísima y una velocidad alta a grandes alturas.

Durante el presente año, la Fábrica Westland ha estado muy ocupado en la fabricación de un aparato comercial pequeño de mucho



Westland Interceptor fighter. Bristol Mercury engine.
 Avion de combat intercepteur Westland (moteur Bristol Mercury).
 Avión de combate interceptor Westland (motor Bristol Mercury).

éxito, que se conoce con el nombre de "Wessex," además de sus aviones corrientes del tipo "Wapiti." Este "Wessex" es un monoplano trimotor de seis asientos, con motores "Genet Major" de la casa Armstrong Siddeley.

El "Wessex" es de construcción "mixta," es decir, parte de madera, y parte de metal. Las alas son de madera, como lo es la parte delantera del fuselaje, y la parte trasera del fuselaje es de metal.

Los motores de babor y estribor están colocados muy bajo, de modo que la corriente retrógrada de aire originada por las hélices no hiere las alas. Estos motores no están suspendidos de las alas, como lo suelen estar, sino que descansan sobre soportes de tubos de acero que sobresalen del fuselaje mismo.

Hay frenos sobre las ruedas, de modo que el aparato puede ser parado con un recorrido cortísimo al tomar tierra.

Normalmente el "Wessex" sirve para el transporte de pasajeros, y recientemente se han entregado varios aparatos a la Empresa Aérea Sabena de Bélgica. El equipo para pasajeros, sillas, etc. pueden, sin embargo, quitarse y el "Wessex" se convierte entonces en un transportador de carga muy eficaz, que puede llevar una carga económicamente provechosa, con gran economía de explotación.

Un aparato experimental muy interesante es el "Pterodactyl" de Westland-Hill. Este aparato, proyectado por el Capitán G. T. R. Hill, es notable por no tener cola de ninguna clase, yendo desempeñadas las funciones de esta parte de un avión del tipo corriente por las superficies de las extremidades de las alas. Esto se hace posible por el hecho de que las alas están inclinadas hacia atrás en un ángulo pronunciado. El "Pterodactyl" tiene además de particular el que no puede perder velocidad en vuelo de la manera ordinaria.

The wing structure is in two sections, and is of wooden construction with rigid-type internal bracing. The two petrol tanks, each of 50 gallons capacity, are housed in the wing and give direct gravity feed to the engines.

The undercarriage gives a very wide wheel track, and as the machine is in itself of low height, it is almost impossible for it to be blown over on to a wing tip, even in a very strong wind. The telescopic legs of the undercarriage are of the oleo type, and Bendix-Perrot wheel brakes are fitted. The tail wheel is fitted with a low-pressure tyre.

As already mentioned, the "Wessex" can be used either as a passenger carrier or as a goods machine. In either form the pay load is very good, being 1,100 lb. as a passenger carrier and 1,200 lb. as a goods machine. In both cases this pay load corresponds to full fuel tanks, i.e., a range of 520 miles. If the tanks are but two-thirds full, the pay load is increased, becoming 1,387 lb. for the passenger machine and 1,488 lb. as a goods machine. The range is then 350 miles.

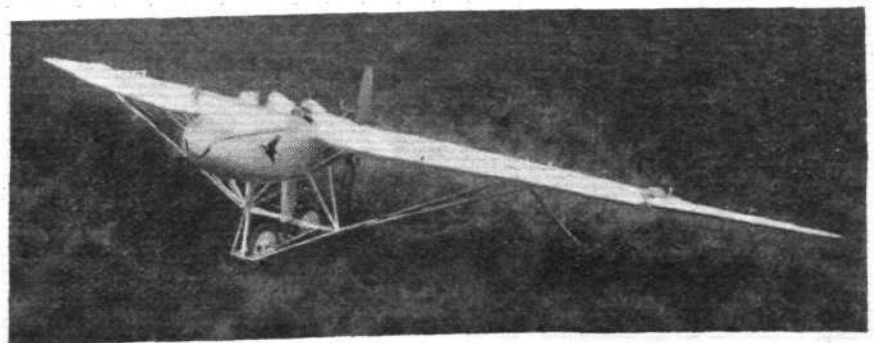
The cruising speed at low altitudes is 95 m.p.h., which is the speed corresponding to the ranges quoted. The maximum speed at low altitudes is 108 m.p.h., and the stalling speed 52 m.p.h.

For some years the Westland Aircraft Works have been experimenting with tailless aeroplanes. Several years ago Capt. G. T. R. Hill conceived the idea that by sweeping back the wings and decreasing the angle of incidence towards the wing tips, it should be possible to obtain stability without the use of a tail. Capt. Hill built the first experimental machine himself, but later he succeeded in interesting the Westland Aircraft Works in his designs, and there he has now been making experiments and built several experimental types.

The Westland-Hill "Pterodactyl" Marks 1A and 1B is a two-seater side-by-side monoplane, fitted with the Armstrong-Siddeley "Genet" engine.

The "Pterodactyl" is controlled in flight by wing surfaces pivoted to the ends of the main wing. When these wing-tip surfaces, or "controllers," as Capt. Hill calls them, are worked together, they act as elevators and change the machine's flight path into an upward or downward one. When used separately they act as ailerons.

Work is now proceeding on a three-seater cabin aircraft of the "Pterodactyl" type. This latest type will incorporate all the improvements suggested by the experience with the smaller machines, and it is expected that, in addition to its non-stalling qualities, the use of a pusher engine will greatly reduce the amount of noise in the cabin.



Westland-Hill Pterodactyl. Armstrong-Siddeley Genet engine.
 Westland-Hill Pterodactyl, avion sans queue (moteur Armstrong-Siddeley Genet).
 Westland-Hill Pterodactyl, avión sin cola (motor Armstrong-Siddeley Genet).

Constructors Constructeurs Constructores	Title of Aircraft Nom de l'avion Nombre del avión	Number of seats Nombre de places Número de asientos	Type Type Tipo	Engine Moteur Motor	Total normal power Puissance normale totale Potencia total (normal)	Overall length Longueur totale Longitud total	Wing span, upper Envergure (plan supérieur) Envergadura (plano superior)	Wing span, lower Envergure (plan inférieur) Envergadura (plano inferior)	Total wing area Surface totale des ailes Superficie total de las alas	Weight, empty Poids à vide Peso (vacío)	Disposable load Charge disponible Carga disponible	Total loaded weight Poids total (chargé) Peso total (cargado)	Maximum speed near ground Vitesse maximum près du sol Velocidad máxima cerca del suelo	Cruising speed Vitesse de croisière Velocidad de crucero	Minimum speed Vitesse minimum Velocidad mínima	Flight duration Durée de vol Duración de vuelo	Flight range Rayon d'action Radio de acción
Armstrong Whitworth ..	Argosy ..	20	B	3 Jaguar ..	b.h.p. 1 300	m. 20,40	m. 27,10	m. 27,10	m. ² 174,0	kg. 5 500	kg. 3 230	kg. 8 730	km./h. —	km./h. —	km./h. —	h. —	km. —
Blackburn ..	Nile ..	14	M	3 Jupiter ..	1 470	20,00	30,50	—	140,0	6 920	3 734	10 654	200	166	96	4,5-8	—
" ..	Bluebird ..	2	B	1 Gipsy I ..	95	7,00	9,12	9,12	22,9	473	322	795	165	138	70	—	—
" ..	Bluebird ..	2	B	1 Cirrus III ..	95	7,00	9,12	9,12	22,9	475	273	748	160	136	70	—	—
" ..	Bluebird ..	2	B	1 Hermes ..	115	7,00	9,12	9,12	22,9	485	310	795	180	151	70	—	—
" ..	Bluebird ..	2	B	1 Genet Major ..	105	7,00	9,12	9,12	22,9	460	335	795	180	151	70	—	—
" ..	Autogiro ..	2	—	1 Genet Major ..	105	10,67	10,67	—	—	436	199	635	145	121	15	—	282
Cierva ..	Coupe ..	2	M	1 Hornet ..	75	5,80	10,80	—	15,5	417	264	681	170	137	58	4,5-9	580-1 160
Civilian ..	Swift ..	1	M	1 Scorpion ..	40	5,72	7,32	—	8,36	214	118	332	170	137	56	4	563
Comper ..	Swift ..	1	M	1 Salomon ..	50	5,72	7,32	—	8,36	—	—	—	185	161	56	—	480
" ..	Swift ..	1	M	1 Poloy ..	75	5,72	7,32	—	8,36	—	—	—	233	193	56	3	580
" ..	Standard Moth ..	2	B	1 Gipsy I ..	95	7,31	9,15	9,15	22,6	420	375	795	159	135	76	—	470
De Havilland ..	Standard Moth ..	2	BS	1 Gipsy I ..	95	7,58	9,15	9,15	22,6	485	310	795	154	130	74	—	450
" ..	Standard Moth ..	2	B	1 Gipsy II ..	120	7,31	9,15	9,15	22,6	425	370	795	169	143	74	—	460
" ..	Standard Moth ..	2	BS	1 Gipsy II ..	130	7,58	9,15	9,15	22,6	490	305	795	163	138	74	—	440
" ..	Special Moth ..	2	B	1 Gipsy II ..	120	7,31	9,15	9,15	22,6	445	350	795	169	143	74	—	460
" ..	Special Moth ..	2	BS	1 Gipsy II ..	120	7,58	9,15	9,15	22,6	510	285	795	163	138	74	—	440
" ..	Puss Moth ..	2-3	M	1 Gipsy III ..	120	7,63	11,20	—	20,6	545	387	932	206	170	68	—	740
" ..	Puss Moth ..	2-3	MS	1 Gipsy III ..	120	7,85	11,20	—	20,6	610	253	863	200	170	69	—	740
" ..	Hawk Moth ..	4-6	M	1 Lynx ..	240	8,81	14,30	—	32,9	1 087	673	1 760	206	177	84	—	450
" ..	Hawk Moth ..	4-6	MS	1 Lynx ..	240	9,45	14,30	—	32,9	1 210	550	1 760	200	170	82	—	435
" ..	Coupe Mark I ..	3	M	1 Hermes ..	115	8,23	11,00	—	17,7	500	363	863	180	160	75	—	800
Desoutter ..	Coupe Mark II ..	3	M	1 Gipsy III ..	120	7,90	10,90	—	17,0	536	374	910	209	—	75	5	800
" ..	302 ..	2	M	1 Hermes ..	115	6,96	10,67	—	15,2	475	387	862	213	180	60	—	730
Hendy ..	Chief ..	3	M	3 Scorpion ..	115	7,47	11,90	—	18,2	412	318	730	177	153	60	4	700
Navarro ..	EH ..	2	B	1 Hermes ..	115	6,98	9,53	9,53	18,1	410	272	682	187	166	65	—	640
Parrell ..	Redwing ..	2	B	1 Genet ..	80	6,80	9,30	9,30	23,2	380	258	648	153	137	49	—	—

B = Biplane; M = Monoplane; A = Amphibian.
S = Float Seaplane, Hydravion à flotteurs, Hidroavión con flotadores.
FB = Flying Boat, Hydravion monocoque, Bote volador.

	Constructores Constructeurs Construtores	Title of Aircraft Nom de l'avion Nombre del avión	Number of seats Nombre de places Número de asientos	Type Type Tipo	Engine Moteur Motor	Total normal power Puissance normale totale Potencia total (normal)	Overall length Longeur totale Longitud total	Wing span, upper Envergure (plan supérieur) Envergadura (plano superior)	Wing span, lower Envergure (plan inférieur) Envergadura (plano inferior)	Total wing area Surface totale des ailes Superficie total de las alas	Weight, empty Poids à vide Peso (vacío)	Disposable load Charge disponible Carga disponible	Total loaded weight Poids total (chargé) Peso total (cargado)	Maximum speed near ground Vitesse maximum près du sol Velocidad máxima cerca del suelo	Cruising speed Vitesse de croisière Velocidad de crucero	Minimum speed Vitesse minimum Velocidad mínima	Flight duration Durée de vol Duración de vuelo	Flight range Rayon d'action Radio de acción
A. V.	Roe " " " Saunders-Roe " " " " " " " " Short .. " " " Southern Spartan " " Superna Vickers " " "	Avro Five .. Avro Six .. Standard Avian .. Sports Avian .. Cutty Sark .. Windhover .. Windhover .. Windhover .. Windhover .. Windhover .. Windhover .. Windhover .. Windhover .. Cloud .. Cloud .. Cloud .. Cloud .. Calcutta .. Valetta .. Valeta .. 4-engined .. Martlet .. 3-Seater .. Arrow .. Arrow .. Arrow .. Sea Hawk .. Viastra .. Viastra .. Viastra .. Vellore .. Westland ..	5-6 6 2 2 4 6 6 6 6 6 6 8-10 8-10 8-10 8-10 16 — — 16 1 3 2 2 2 12 12 12 12 — 4-6	M M B B MEFB MEFB MEFB MEFA MEFBA MEFB MEFA MEFB MEFB MEFB MEFB MEFB MS M B B B B B B B B M M M M M M	3 Genet Major .. 3 Genet Major .. 1 Genet Major .. 1 Hermes .. 2 Hermes .. 3 Gipsy II .. 2 Mongoose .. 2 Mongoose .. 2 Double Mongoose .. 1 Double Mongoose .. 3 Lynx .. 3 Lynx .. 2 Whirlwind .. 2 Whirlwind .. 2 Whirlwind .. 2 Whirlwind .. 3 Jupiter IX .. 3 Jupiter XI F .. 3 Jupiter XI F .. 4 Jupiter XI B.M. 1 Genet II .. 1 Hermes .. 1 Gipsy I .. 1 Gipsy I .. 1 Gipsy II .. 3 Panther .. 2 Jupiter XI F .. 2 Jaguar VI C .. 3 Lynx .. 2 Jupiter XI F .. 3 Genet Major ..	b.h.p. 315 315 105 115 230 360 360 310 310 340 340 645 645 600 600 600 600 1455 1470 1470 2220 80 115 100 115 120 1520 1050 980 700 1050 315	m. 10.90 11.00 7.40 7.40 10.42 12.60 12.60 12.60 12.60 12.60 15.16 15.16 15.16 15.16 15.16 20.10 21.23 — 22.80 6.10 7.77 7.62 7.62 7.62 18.30 14.80 14.80 14.80 14.62 11.55	m. 14.30 15.50 8.53 8.53 13.70 16.55 16.55 16.55 16.55 16.55 19.50 19.50 19.50 19.50 19.50 28.35 32.61 32.61 34.40 7.60 8.85 9.32 9.32 9.32 24.10 21.30 21.30 21.30 23.20 17.50	m. — — 8.53 8.53 — — — — — — — — — — — 23.15 — — 28.20 7.60 8.85 9.32 9.32 9.32 — — — — —	m² 30.6 33.5 22.6 22.6 29.8 41.8 41.8 41.8 41.8 41.8 41.8 60.4 60.4 60.4 60.4 60.4 60.4 128.4 128.4 128.4 — 16.75 22.3 23.3 23.3 23.3 115.0 69.3 69.3 69.3 127.8 45.5	kg. 1295 1365 455 455 1102 1620 1745 1545 1670 1510 1630 2670 2870 2380 2380 2580 1730 4400 3567 3567 8125 320 465 432 443 438 5120 — — — — 969	kg. 818 905 273 273 576 830 705 845 720 990 870 1880 1450 2160 4550 1730 4400 3567 3567 5630 148 300 363 352 357 3750 — — — — 2600	kg. 2113 2270 728 728 1678 2450 2450 2390 2390 2500 2500 4550 4320 4550 4550 4320 4320 10225 10160 9910 13755 468 765 795 795 795 8870 5380 5380 5380 5680 2600	km./h. 182 182 162 162 169 177 166 177 166 185 174 190 180 190 182 180 198 217 222 213 179 161 138 161 166 169 — — — — 174	km./h. 153 153 145 168 — 150 142 150 142 158 148 162 153 162 153 153 161 175 175 161 153 138 134 137 145 — 210 200 193 193 153	km./h. — — 72 72 — — — — — — — — — — — — 98 105 104 97 65 71 64 64 64 — — — — 83	h. — — 4 — 4 4 4 4 4 4 4 4 4 4 4 4 8 — — — 3 — — — — — — — — 5-5	km. — — 580 — — — — — — — — — — — — 1045 835 835 1288 450 440 820 750 660 — 480 480 480 480 883

Constructors Constructeurs Constructores	Title of Aircraft Nom de l'avion Nombre del avión	Type. Type. Tipo.	Engine Moteur Motor	Overall length Longeur totale Longitud total	Wing span, upper Envergure (plan supérieur) Envergadura (plano superior)	Wing span, lower Envergure (plan inférieur) Envergadura (plano inferior)	Total wing area Surface totale des ailes Superficie total de las alas	Weight, empty Poids à vide Peso (vacío)	Disposable load Charge disponible Carga disponible	Total loaded weight Poids total (chargé) Peso total (cargado)	Maximum speed at 1525 metres Vitesse maximum à 1525 mètres Velocidad máxima a 1525 metros	Initial rate of climb Vitesse ascensionnelle initiale Velocidad ascensional inicial	Time to climb to 10,000 ft. Temps nécessaire pour monter à 3050m. Tiempo para subir a 3050 metros	Ceiling (i.e., maximum altitude) Plafond (à savoir altitude maximum) Techo (v.g. altitud máxima)	Flight duration Durée de vol Duración de vuelo	Flight range Rayon d'action Radio de acción
Armstrong-Whitworth	Atlas	B	Jaguar ..	m. 8.68	m. 12.05	m. —	m ² . 36.3	kg. —	kg. —	kg. 1 870	km./h. 233	m./sec. —	min. 10.5	m. 5 400	h. —	km. —
"	Starling	B	Jaguar ..	7.67	9.55	7.24	22.9	—	—	1 410	285*	—	7.0	8 400	—	—
Blackburn	Nautilus	B	Rolls F XII ..	9.60	11.25	—	—	1 460	691	2 151	247	6.07†	—	5 715	2‡	—
"	Lincock	B	Lynx ..	5.90	7.40	—	15.8	651	292	943	241†	6.30	—	5 280	—	—
"	Iris III	BF	3 Condor III B	20.40	29.40	—	—	8 743	4 394	13 137	195§	3.18	—	3 222	—	—
Boulton and Paul	Sidstrand III	B	2 Jupiter VIII	12.50	21.95	21.95	91.0	2 732	1 904	4 636	227	—	11.2	7 300	—	—
"	Partridge	B	1 Jupiter VII S	7.10	10.60	9.40	28.7	919	489	1 408	270	—	6.5	8 850	—	—
Bristol ..	Bulldog	B	1 Jupiter VI ..	7.55	10.35	—	28.6	1 034	470	1 504	264	—	7.3	8 900	—	—
" ..	Bulldog	B	1 Jupiter VII ..	7.55	10.35	—	28.6	1 034	486	1 520	285	—	6.7	8 900	—	—
Gloster ..	S.S. 18	B	1 Jupiter VII F	7.85	10.00	10.00	27.9	—	—	1 500	322	—	5.0	8 950	—	—
Handley-Page ..	Hinaidi	B	2 Jupiter VIII	18.00	22.85	22.85	—	3 286	2 707	5 993	196	3.50	—	4 420	—	1 370
Hawker	Tomtit	B	1 Mongocose ..	7.24	8.69	8.69	22.1	500	295	795	192	—	14.7	—	—	—
Short ..	Singapore I ..	B	2 H. 10 MS	20.00	28.35	—	161.0	6 250	3 300	9 550	213§	4.57	—	6 820	—	1 465
" ..	Gunnard	B	1 Jupiter X ..	8.40	11.30	11.30	39.9	1 403	773	2 176	268¶	5.60¶	—	8 700	—	—
Supermarine	Southampton	BF	2 Lion ..	15.16	21.30	21.30	142.5	3 980	2 660	6 640	174§	—	10.0**	4 270	—	1 290
Vickers ..	Vespa	B	1 Jaguar VI C ..	10.10	15.24	13.41	53.5	1 307	676	1 983	209*	—	15.8††	—	—	—
Westland	Wapiti	B	1 Jupiter IX F	9.90	14.10	14.10	45.4	1 440	1 010	2 450	224	—	9.4	6 100	5	852
"	Wapiti	BS	1 Jupiter IX F	10.30	14.10	14.10	45.4	1 645	805	2 450	214	—	12.0	5 340	5	788

* At 4 600 m.
† At 1 525 m.

At ground level.
At sea level.

B = Biplane.
F = Flying Boat, Hydravion monocoque, Bote volador.
S = Float Seaplane, Hydravion à flotteurs, Hidroavion con flotadores.

At 3 050 m.
At 4 000 m.

** To 1 525 m.
†† To 4 500 m.

BRITISH AERO ENGINES

MOTEURS D'AVIATION
BRITANNIQUE

MOTORES BRITÁNICOS
DE AVIACIÓN

IN the early days of aviation the engines in use in Great Britain were mostly imported. During the war, however, most of the larger automobile engineering firms had of necessity to direct their attention and energies to this previously neglected field, and they did so to such good purpose that by the end of the war Britain was not only meeting all her own requirements, but was exporting aero engines for the use of some of the allied forces. Development was temporarily slowed down in the immediately post-war period, but during this period many of the engines which had been hurriedly produced to meet the past emergencies proved the fundamental soundness of their design and construction by performing some truly remarkable and epoch-making flights. Foremost among these flights must be counted the return crossing of the Atlantic by H.M. Airship R.34, fitted with Sunbeam engines, and the first aeroplane crossing by the late Alcock and Brown in a modified war-time Vickers Vimy with Rolls-Royce engines. Whilst on the subject of ocean flights, it should be remembered that the first South Atlantic flight by seaplane was made by the Portuguese airmen Coutinho and Cabral on a Fairey seaplane with Rolls Royce engine. Since the time when the world was amazed at these early feats of endurance, British aero engines have steadily built up and maintained a reputation for reliability, performance and craftsmanship that is, and is likely to remain, unchallenged. Turning to the later outstanding achievements, it will be recalled that at one time the Napier engine had the world's air, land, and water speed records to its credit. Two of these, the air and water speed records, have now been wrested from the Napier, but, be it noted, by another British engine, the Rolls-Royce. It will be remembered that a Rolls-Royce engined Supermarine monoplane won the Schneider Trophy last year, and also the speed record at 576 km./h.

A particularly significant fact that should not be over-

looked is that the records and outstanding flights accomplished by British engines are distributed between the various makes, and do not stand to the credit of any one firm alone. There exists a very keen rivalry among the British aero engine manufacturers, which, as it is of the right type, is all to the good, so far as the purchaser is concerned.

Those firms who in the difficult days after the war continued their pioneer work are now reaping their just reward, for each has prospered and their works and staffs have expanded to many times their size of ten years ago. Furthermore, not only have the pioneers survived, but new firms have entered the market, more particularly in the smaller engine class. That these newer engines are worthily maintaining the traditions of those built by the older established firms has been emphatically demonstrated by the recent Australian flights. Turning to a less spectacular field in which British aero engines have established a reputation for reliability, the activities of Imperial Airways provide an example which it would be difficult to equal. The almost clockwork regularity of the services carried on over land and sea under all conditions and over most hazardous country, in the case of the Indian Air Mail Service, is dependent entirely on the reliability of the British engines fitted in these machines. It is routine work of which little is heard, but it represents a wonderful achievement in engine development nevertheless. The British aircraft industry has just reason to be proud of its aero engine section and of the enviable position it holds in the markets of the world.

The following notes relating to modern British engines are published primarily for the benefit of our Continental readers, and are intended to give a brief but comprehensive survey of the latest types, the majority of which are available for purchase by foreign buyers; the descriptions are general, and are not confined to those engines exhibited at the Paris Aero Show.

AUX premiers jours de l'aviation les moteurs utilisés en Grande-Bretagne étaient généralement importés. Mais pendant la guerre la plupart des grandes firmes automobiles durent nécessairement tourner leur attention et leurs énergies vers ce domaine jusqu'alors négligé, et elles le firent si effectivement qu'avant la fin de la guerre la Grande-Bretagne non seulement suffisait à ses propres besoins mais exportait des moteurs d'aviation destinés à être utilisés par des forces alliées. Les progrès furent relativement lents pendant la période qui fit immédiatement suite à la guerre; néanmoins durant ce temps nombre de moteurs qui avaient été produits à la hâte pour faire face aux besoins pressants de l'heure donnèrent des preuves de l'excellence fondamentale de leur conception et de leur construction en accomplissant des vols vraiment remarquables et historiques. En tête du palmarès de ces vols doivent figurer la traversée aller et retour de l'Atlantique par le dirigeable R 34 équipé de moteurs Sunbeam, et la première traversée transatlantique en avion par le regretté Alcock et Brown dans un avion Vickers Vimy de la période de guerre modifié qu'actionnaient des moteurs Rolls-Royce. A propos de vols transocéaniques, on se rappellera que la première traversée de l'Atlantique Sud en hydravion a été accomplie par les aviateurs portugais Coutinho et Cabral sur un hydravion Fairey muni d'un moteur Rolls-Royce. Depuis les jours où le monde s'émerveillait de ces premières prouesses d'endurance, les moteurs d'aviation britanniques se sont acquis et ont maintenu une réputation de sûreté, de performance et d'excellence de construction qui est et demeurera probablement sans rivale. Pour en venir aux derniers exploits les plus marquants, on se rappelle qu'à une époque le moteur Napier détenait les records de vitesse du monde dans l'air, sur terre et sur l'eau. Deux de ces records, ceux de vitesse dans l'air et sur l'eau, ont été ravis au Napier, mais, qu'on ne l'oublie pas, par un autre moteur anglais, le Rolls-Royce. On se rappelle qu'un monoplan Supermarine à moteur Rolls-Royce gagna la coupe Schneider l'année dernière ainsi que le record de la vitesse, à 576 kilomètres à l'heure. Un fait particulièrement significatif qu'il importe de ne pas perdre de vue, c'est que

les records et vols remarquables accomplis par les moteurs anglais se répartissent entre les différentes marques et ne sont pas l'apanage d'un seul constructeur. Il existe une très vive émulation entre les constructeurs anglais de moteurs d'aviation, mais c'est une rivalité de bon aloi qui ne peut que profiter à l'usager.

Les firmes qui, pendant les jours difficiles d'après-guerre, ont poursuivi leurs efforts de pionniers, moissonnent aujourd'hui leur juste récompense, car elles ont toutes prospéré et leurs personnels ont pris des proportions égales à plusieurs fois celles d'il y a dix ans. D'autre part, non seulement les pionniers ont survécu, mais de nouveaux constructeurs sont entrés en lice, particulièrement dans la catégorie des petits moteurs. Que ces nouveaux engins maintiennent dignement les traditions de leurs aînés construits par les maisons établies de longue date, c'est ce que prouvent incontestablement les récentes randonnées australiennes. Pour envisager un domaine moins théâtral dans lequel les moteurs d'aviation anglais ont conquis une réputation de sûreté de service, les activités de la société Imperial Airways ne présentent-elles pas un exemple qu'il serait difficile d'égaler? La régularité presque chronométrique des services terrestres et transmaritimes par tous les temps, et sur une région des plus hasardeuses dans le cas du service aéropostal indien, dépend entièrement de la sûreté de fonctionnement des moteurs anglais équipant ces avions. C'est une œuvre journalière dont on n'entend guère parler, mais qui témoigne néanmoins de merveilleux progrès dans le perfectionnement des moteurs. L'industrie aéronautique britannique a justement raison d'être fière de sa branche des moteurs aériens et de la position enviable qu'elle occupe dans les marchés du monde.

Les notes ci-après sur les moteurs anglais modernes sont publiées primordialement pour le bénéfice de nos lecteurs continentaux et se proposent pour objet de donner un aperçu bref mais complet des types les plus récents, dont la plupart sont à la disposition des acheteurs étrangers. Les descriptions ont un caractère général et ne sont pas limitées aux moteurs exposés au Salon de Paris.

EN los primeros días de la aviación, los más de los motores empleados en la Gran Bretaña eran importados. Durante la Guerra, sin embargo, la mayor parte de las casas constructoras de automóviles se vieron obligadas a dirigir su atención y sus energías a este campo anteriormente descuidado, y lo hicieron tan bien que, llegado el fin de la Guerra, la Gran Bretaña no sólo suplía sus propias necesidades, sino que también estaba exportando motores de aviación para uso de algunas de las fuerzas aliadas. Terminado que fuese la guerra amainó momentáneamente la actividad en este campo, pero durante este período, muchos de los motores que se habían construido de prisa para suplir las necesidades del momento demostraron la bondad fundamental de su concepción y construcción, realizando algunos vuelos verdaderamente notables que hicieron historia.

De estos vuelos los más notables fueron la travesía en ambos sentidos del Atlántico por la aeronave británica No. R. 34, dotada con motores Sunbeam, y la primera travesía en aeroplano del mismo océano por el finado Alcock y Brown, en un aparato Vickers-Vimy de la época de la guerra modificado, propulsado por motores Rolls-Royce. Ya que hablamos de las travesías transoceánicas, debe recordarse que el primer vuelo a través del Atlántico Austral en hidroavión fué realizado por los aviadores portugueses Coutinho y Cabral en un hidroavión Fairey, propulsado por un motor Rolls-Royce. Desde el tiempo en que el mundo se maravillaba de estas primeras hazañas, los motores de aviación británicos han adquirido y mantenido, por su seguridad de funcionamiento, lo elevado de su rendimiento y lo esmerado de su ejecución, una reputación que es y probablemente permanecerá sin igual. Pasando ahora a las últimas proezas más notables, se recordará que en una época el motor Napier tenía los records mundiales de velocidad en el aire, en tierra y sobre el agua.

Dos de estos records, el de la velocidad en el aire y sobre el agua, han sido batidos, pero, dicho sea de paso, por otro motor británico, el Rolls-Royce. Se recordará que un monoplano Supermarine propulsado por un motor Rolls-Royce ganó el Trofeo Schneider el año pasado, y estableció también el record de la velocidad marchando a 576 km.

por hora. Un hecho particularmente significativo que no debe perderse de vista, es que todos los records y vuelos notables realizados por aparatos propulsados por motores británicos, están repartidos entre las varias marcas y no representan el triunfo de un solo constructor. Hay una emulación vivísima entre los constructores británicos de motores de aviación, pero es una rivalidad de buena ley que no puede sino reportarle ventajas a quien los emplea.

Aquellas casas, que en los días difíciles después de la Guerra continuaron sus trabajos de exploración y experimentación están ahora sacando provecho de su perseverancia, pues todas ellas han prosperado y sus talleres y personales son hoy muchas veces mayores que hace 10 años. Además, no sólo los exploradores han sobrevivido, sino que también han entrado en liza nuevas casas, particularmente en la categoría de los motores pequeños. Que estos nuevos motores están manteniendo noblemente las tradiciones de sus predecesores construidos por las casas más antiguas queda puesto de manifiesto por los últimos vuelos a Australia. Pasando ahora a un campo menos teatral en que los motores británicos se han hecho célebres por su seguridad de funcionamiento, las actividades de la empresa Imperial Airways presentan un ejemplo que difícil sería igualar. La regularidad casi cronométrica de los servicios terrestres y transoceánicos en todos tiempos y por encima de terreno peligrosísimo en el caso del Servicio Aeropostal de la India, depende enteramente de la seguridad de marcha de los motores británicos que llevan estos aparatos. Es un trabajo cotidiano de que poco se oye, pero que atestigua maravillosos adelantos en el perfeccionamiento de los motores. La industria británica aeronáutica tiene toda razón para estar orgullosa de los que construyen sus motores de aviación, y de la envidiable posición que ocupan en los mercados del mundo.

La breve reseña que damos a continuación de los motores británicos modernos es principalmente destinada a dar a nuestros lectores de ultramar una idea sucinta pero completa de los últimos tipos, que en su mayoría están a la disposición de los compradores extranjeros. Las descripciones son de carácter general y no están limitadas a los motores expuestos en la Exposición Aeronáutica de París.

INDEX TO AERO ENGINES

INDEX DES MOTEURS D'AVIATION

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A.B.C.

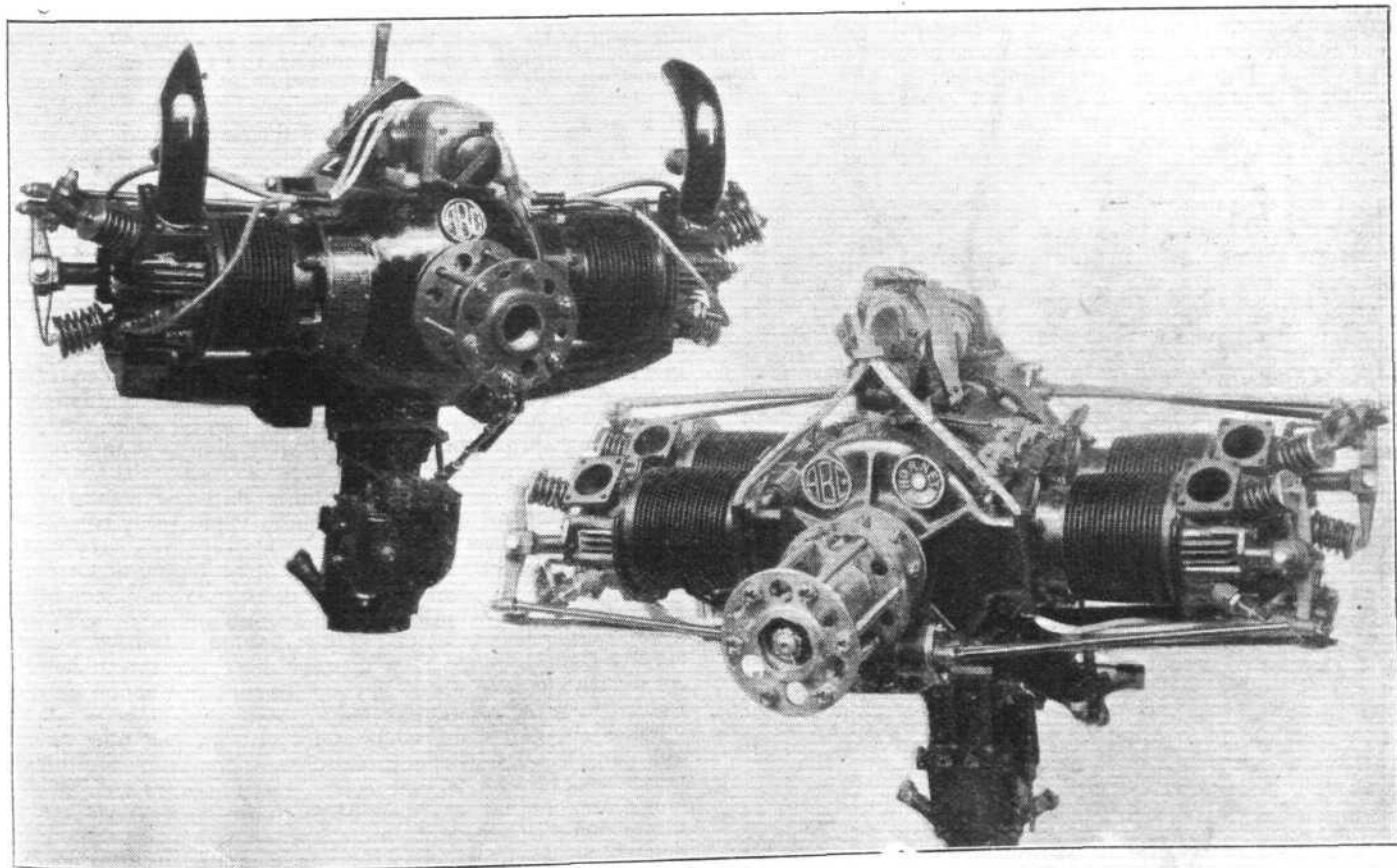
A.B.C. MOTORS, LIMITED,
WALTON-ON-THAMES

THE A.B.C. Co. are specialists in the design of the air-cooled, horizontally-opposed cylinder type of engine. Two models are available, one a two-cylinder 34-h.p. and the other a four-cylinder 75-h.p. engine, the latter being a tandem version of the two-cylinder engine. The cylinders of the two types are interchangeable and have a bore and stroke of 102 mm. and 122 mm. respectively. The cast-iron cylinder heads, each fitted with two valves, are bolted to steel barrels. The induction manifold is formed integral with the bottom of the crankcase, by which means the mixture is heated and the oil in the crankcase is cooled. The one-piece crankshaft is supported by roller bearings at each end, a central plain bearing being provided between the crank throws of the four-cylinder engine. A Zenith carburettor is fitted and one or two magnetos, as desired, are mounted on a platform formed by the top surface of the crankcase body; two sparking plugs are fitted in each cylinder head. The airscrew shaft is formed by an extension of the crankshaft, the accessory and the auxiliary drives being taken from the rear end of the crankshaft. Four steel tubes are fitted horizontally to the crankcase to form bearers; these are provided with flanged ends, for attachment to the bulk head. Further particulars and performance figures are given in the table on page 1339.

LA COMPAGNIE A.B.C. se spécialise dans la construction de moteurs à refroidissement par air du type à cylindres horizontaux opposés. Il en existe deux modèles : un deux-cylindres de 34 h.p. et un quatre-cylindres de 75 h.p., ce dernier étant un exemplaire en tandem du moteur deux cylindres. Les cylindres des deux types sont interchangeables. Les culasses en fonte, portant chacune deux soupapes, sont boulonnées aux fûts, qui sont en acier. Le collecteur d'admission est solidaire du fond du carter, de sorte que le mélange est réchauffé pendant que l'huile renfermée dans le carter est refroidie. Le vilebrequin d'une seule pièce est

supporté par des paliers à rouleaux à chacune de ses extrémités, et un palier central lisse est prévu entre les coudes du vilebrequin du moteur à quatre cylindres. Le carburateur est un Zenith, et il est monté une ou deux magnétos, au choix, sur une plateforme ménagée à la surface supérieure du carter; chaque culasse possède deux bougies d'allumage. L'arbre porte-hélice est constitué par un prolongement du vilebrequin, et les commandes accessoires et auxiliaires reçoivent leur mouvement de l'extrémité arrière du vilebrequin. Quatre tubes en acier fixés horizontalement au carter constituent les supports du moteur; leurs extrémités sont munies de brides permettant de les fixer à la cloison.

LA COMPAÑIA A.B.C. se especializa en la construcción de motores de enfriamiento por aire, del tipo con cilindros horizontales opuestos, de los que hay dos modelos: uno de dos cilindros de 34 c. de f. y otro de cuatro cilindros y de 75 c. de f., siendo el último una variante en tandem del motor de dos cilindros; los cilindros de ambos tipos son intercambiables. Las culatas de hierro fundido, provistas cada una de dos válvulas, están empernadas a los cuerpos de los cilindros, que son de acero. El conducto de admisión forma parte integrante del fondo del carter, de suerte que la mezcla va calentada mientras el aceite en el carter es enfriado. El cigüeñal de una sola pieza está sostenido por cojinetes de rodillos a cada extremidad, y en el caso del motor de cuatro cilindros hay un cojinete sencillo central entre los codos del cigüeñal. El carburador es del tipo Zenith, y una o dos magnetos, según se desee, están montadas sobre una plataforma formada por la superficie superior del carter; cada culata lleva dos bujías. El eje de la hélice lo constituye una prolongación del cigüeñal, y los mandos accesorios y auxiliares reciben su movimiento de la extremidad trasera del cigüeñal. Fijados horizontalmente al carter hay cuatro tubos de acero que sirven de apoyos al motor. Estos tubos tienen en sus extremidades bridas para su fijación al mamparo.



A.B.C. Scorpion 2-cylinder and Hornet 4-cylinder engine.
Moteurs Scorpion A.B.C. à 2 cylindres et Hornet à 4 cylindres.
Motores A.B.C. Scorpion de 2 cilindros, y Hornet de 4 cilindros.

ARMSTRONG-SIDDELEY

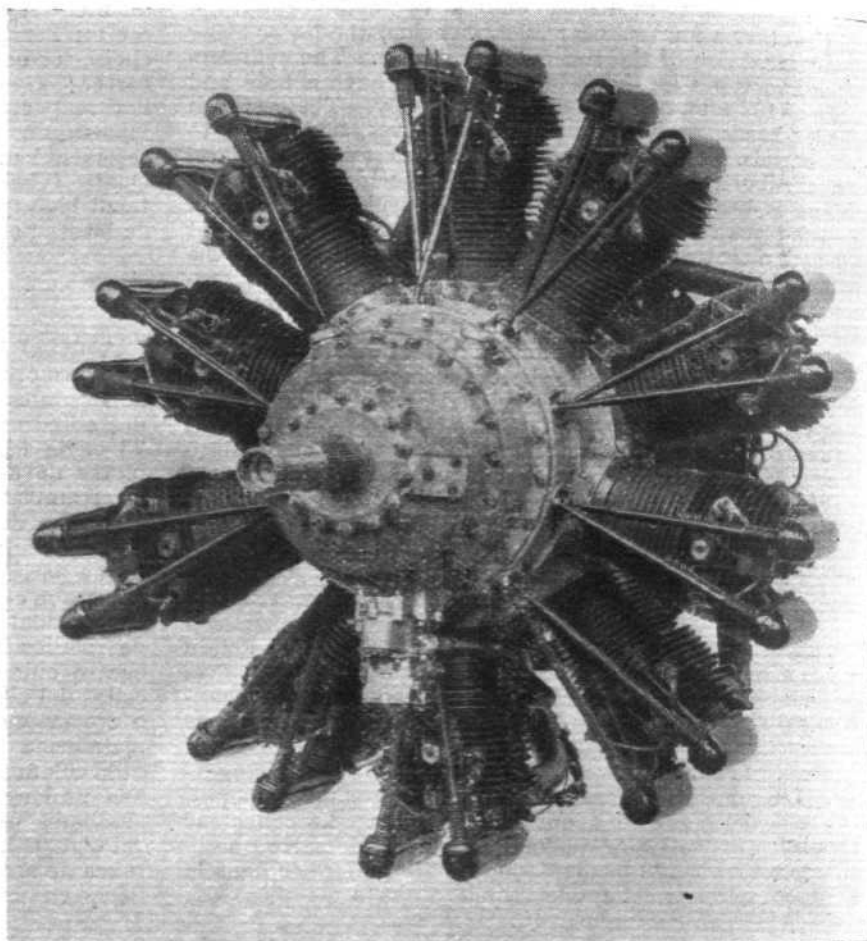
ARMSTRONG-SIDDELEY MOTORS, LTD.,

WORKS:
COVENTRY

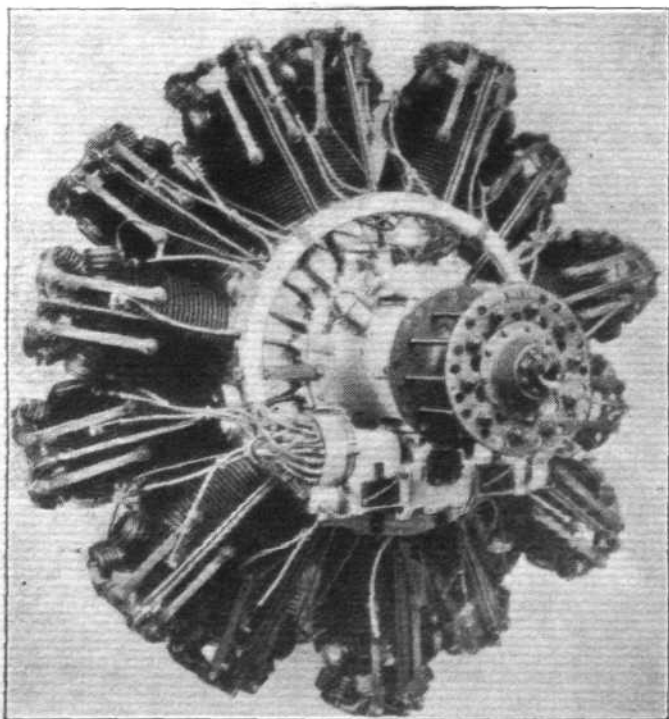
LONDON OFFICE:
10, OLD BOND STREET, W.1

THE Armstrong-Siddeley range of aero-engines, numbering eighteen, including all variations of the main types, covers a gradually increasing power scale from 80 h.p. to 800 h.p. Many of these engines are already well known to our readers in Europe. The characteristic features common to all are as follows: The body portion of the crankcase is a single casting closed by front and rear covers, the crankshaft is in one piece, the connecting-rod assembly being of the split master-rod type and the cylinders are of composite construction having aluminium alloy heads, screwed and shrunk on to steel barrels. With the exception of the Leopard, two valves per cylinder are provided.

Five, seven, ten, and fourteen-cylinder engines are made by this firm, these being divided into five main types, namely, the five-cylinder Genet and Mongoose, the seven-cylinder Genet Major and Lynx, and the fourteen-cylinder Jaguar and Leopard; the two latter engines being of the double-row seven-cylinder type; the ten-cylinder engine of two rows of five, known as the Double Mongoose. In addition to the main types, there are intermediate types, known as the Major series, these being the Genet, the Lynx, or Jaguar Major, each of which has a slightly larger bore and a higher crankshaft speed than its prototype resulting in a 20 per cent. increase in power output. The Lynx, the Double Mongoose, the Jaguar and Leopard engines are all available in geared form, and the Lynx and Jaguar engines may be provided with superchargers. The reduction gear is of the spur-wheel epicyclic type known on the Continent as the Lorraine reduction gear. The cylinders of engines of similar series, as, for instance, the Mongoose, Lynx and Jaguar, are interchangeable, a similar feature applying to the related types in the Major series. Further particulars and performance figures are given in the table on page 1339.



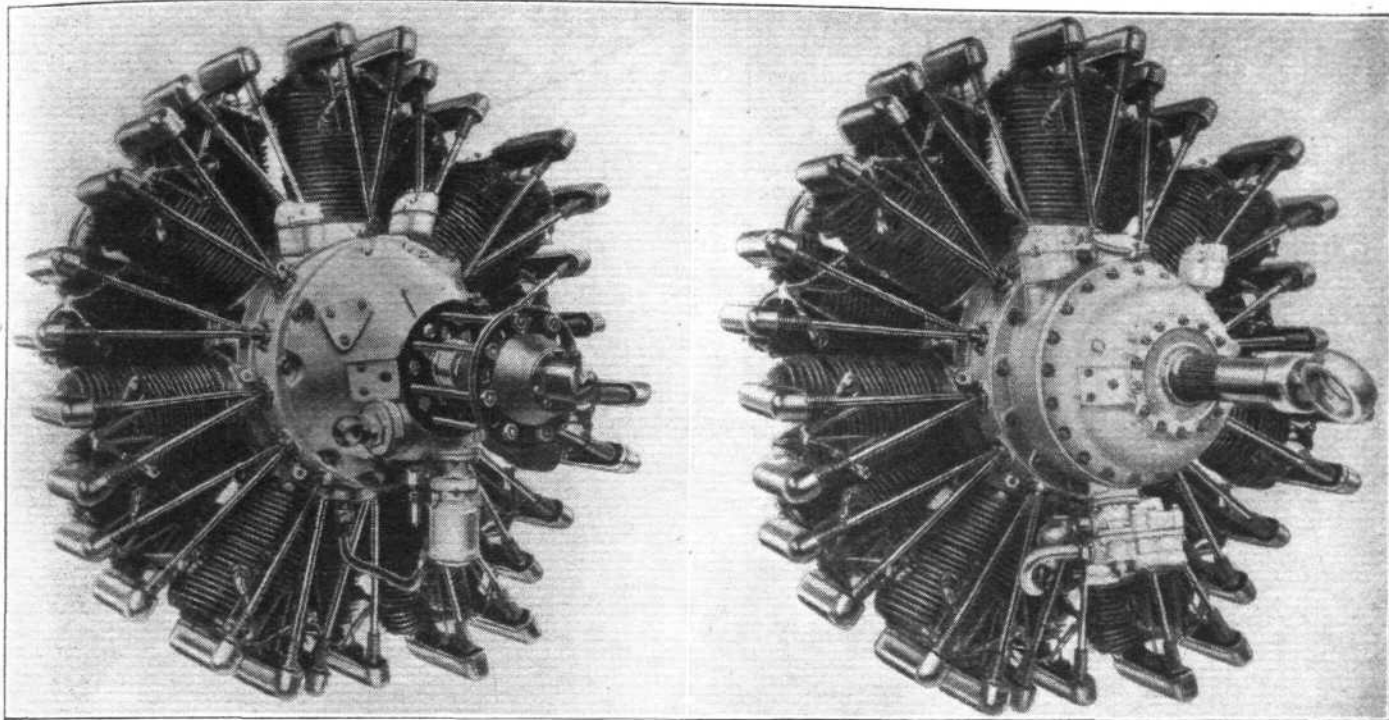
Armstrong-Siddeley Double Mongoose 10-cylinder engine.
Moteur Double Mongoose Armstrong-Siddeley à 10 cylindres.
Motor Armstrong-Siddeley Double Mongoose de 10 cilindros.



Armstrong-Siddeley "Leopard."

LA gamme des dix-huit moteurs d'aviation à air en étoile Armstrong-Siddeley, avec toutes les variations des principaux types, offre une série de puissances s'élevant graduellement de 80 jusqu'à 800 h.p. Beaucoup de ces moteurs sont déjà bien connus de nos lecteurs d'Europe. Les traits caractéristiques communs à tous les types sont les suivants: la partie principale du carter est formée d'un moulage unique en alliage d'aluminium fermé par des couvercles à l'avant et à l'arrière; le vilebrequin est d'une seule pièce, l'embiellage étant du type à tête divisée de la bielle maîtresse; quant aux cylindres, ils sont de construction composite et comportent des culasses en alliage d'aluminium vissées et assujetties à chaud sur des fûts en acier. A part la seule exception du "Leopard," il y a deux soupapes par cylindre.

La maison construit des moteurs de cinq, sept, dix et quatorze cylindres répartis entre cinq types principaux: les cinq-cylindres Genet et Mongoose, les sept-cylindres Genet Major et Lynx, et les quatorze-cylindres Jaguar et Leopard, ces deux derniers étant du type à deux rangées de cylindres. Le moteur à dix cylindres est un "double Mongoose," c'est-à-dire qu'il présente deux rangées de cinq cylindres. Outre ces types principaux, il y a aussi des types intermédiaires constituant la série dite "Major," ce sont le Genet Major, le Lynx Major et le Jaguar Major, dont les alésages et les vitesses angulaires du vilebrequin sont un peu plus grands que dans leurs prototypes, ce qui leur donne un surcroît de puissance d'environ 20 pour cent. Les moteurs Lynx, Double Mongoose, Jaguar et Leopard se fournissent tous sous la forme démultipliée, et le moteur Jaguar, à prise directe ou démultiplication, se construit aussi avec compresseur de suralimentation. Le Lynx à prise directe peut aussi être muni d'un compresseur. Le réducteur d'hélice est du type à satellites droits, connu sur le Continent sous le nom de réducteur Lorraine. Les cylindres de tous les moteurs d'une



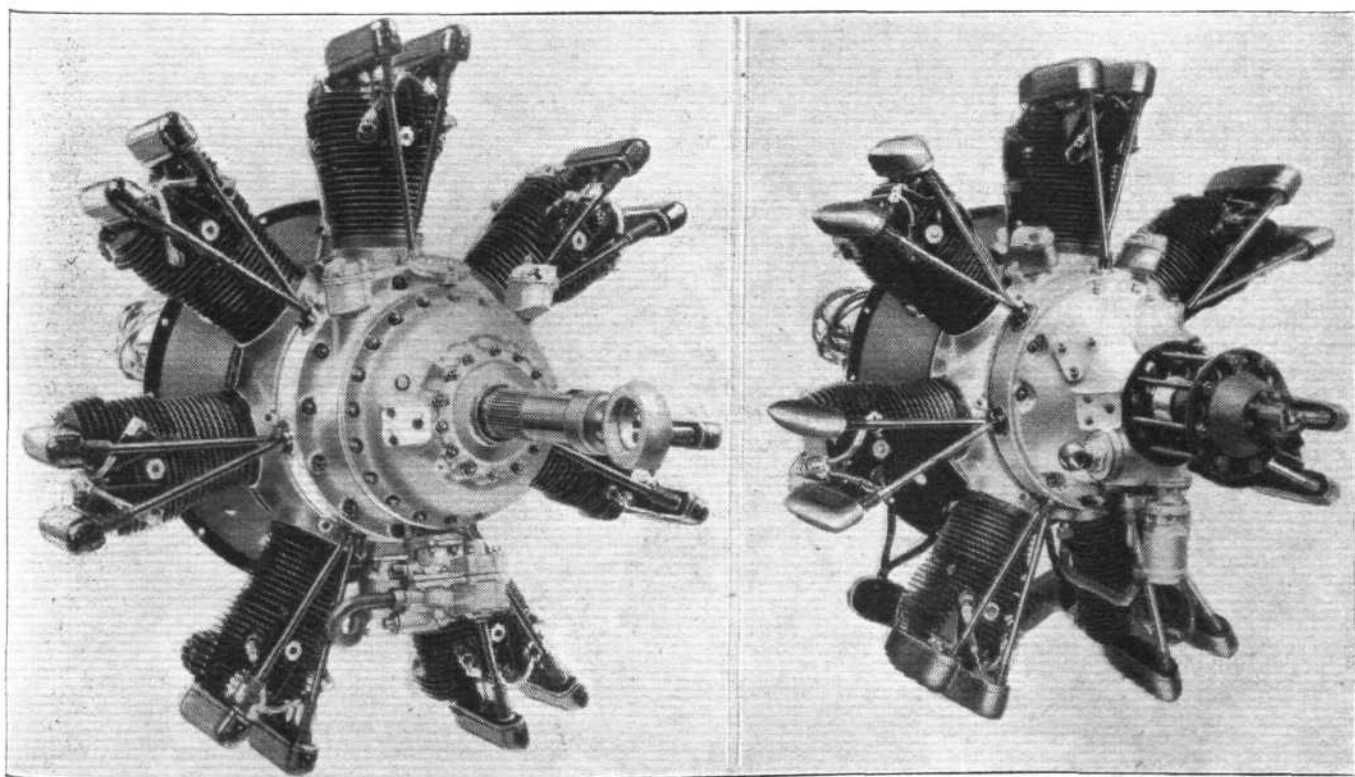
On the left the direct-drive, and on the right the geared Jaguar.
A gauche le moteur Jaguar à prise directe, et à droite celui à démultiplication.
A la izquierda el motor Jaguar de toma directa y a la derecha el desmultiplicado.

même série, tels que, par exemple, le Mongoose, le Lynx, le Jaguar, sont interchangeables, et il en est de même pour les types apparentés de la série Major.

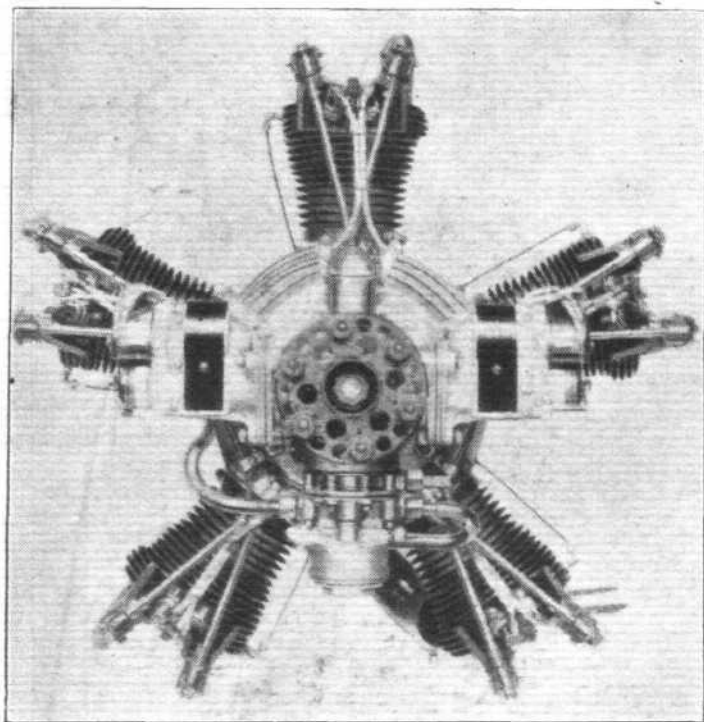
LOS dieciocho motores de aviación en estrella con enfriamiento por aire de la Casa Armstrong Siddeley representan, con todas las variantes de los tipos principales, una serie de potencias que aumentan gradualmente del 80 hasta 800 c. de f. Muchos de estos motores son ya bien conocidos de nuestros lectores europeos. Las características comunes a todos los tipos son como sigue: la parte principal del cárter es una pieza fundida única de aleación de aluminio, cerrada por cubiertas por delante y por detrás; el cigüeñal

es de una sola pieza y el sistema de bielas del tipo con biela maestra de cabeza partida. Los cilindros son de construcción mixta, teniendo culatas de aleación de aluminio roscadas y puestas en caliente sobre cuerpos de acero. Salvo el Leopard, todos los motores tienen dos válvulas por cilindro.

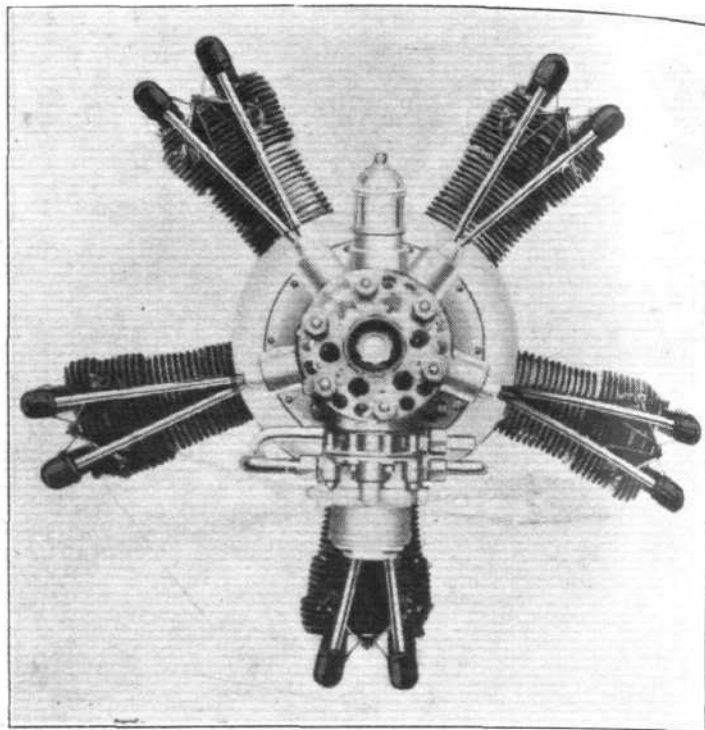
Esta casa construye motores de cinco, siete, diez y catorce cilindros, repartidos en cinco categorías principales: los de cinco cilindros Genet y Mongoose, los de siete cilindros Genet Major y Lynx, y los de catorce cilindros Jaguar y Leopard, siendo los dos últimos del tipo con dos hileras de siete cilindros. El motor de diez cilindros es un "Double Mongoose," es decir, hay dos hileras de cinco cilindros. Además de estos tipos principales, hay tipos intermedios que constituyen la llamada Serie Major, siendo éstos el Genet Major, el Lynx Major y el Jaguar Major. Los diámetros interiores de los



On the left the geared Lynx, and on the right the direct-drive Lynx.
A gauche le moteur Lynx à démultiplication, et à droite celui à prise directe.
A la izquierda el motor Lynx desmultiplicado y a la derecha el de toma directa.



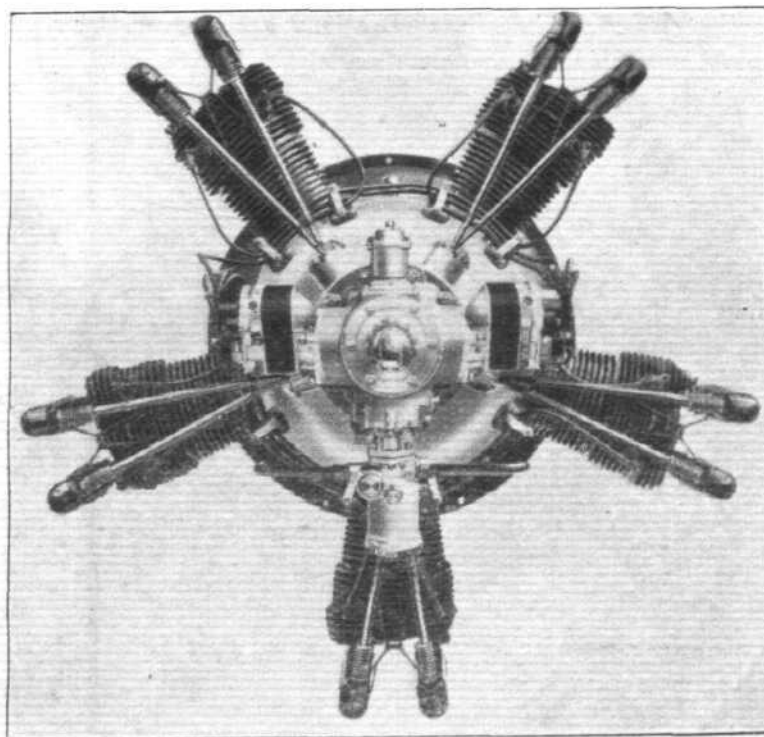
Armstrong-Siddeley "Genet."



Armstrong-Siddeley "Genet Major."

cilindros y las velocidades del cigüeñal de estos motores son un poco mayores que en sus prototipos, lo que da un aumento de potencia del 20 per cent. poco más o menos. El Lynx, el Double Mongoose, el Jaguar y el Leopard se suministran todos en la forma desmultiplicada, y el motor Jaguar de toma directa o con desmultiplicación se construye también con compresor sobrealimentador. El Lynx con toma directa

puede también dotarse de un sobrealimentador. El reductor de la hélice es del tipo de satélites rectos, conocido en el continente europeo con el nombre de reductor Lorraine. Los cilindros de todos los motores de una misma serie como, por ejemplo, el Mongoose, el Lynx y el Jaguar, son intercambiables, y lo mismo puede decirse de los tipos afines de la Serie Major.



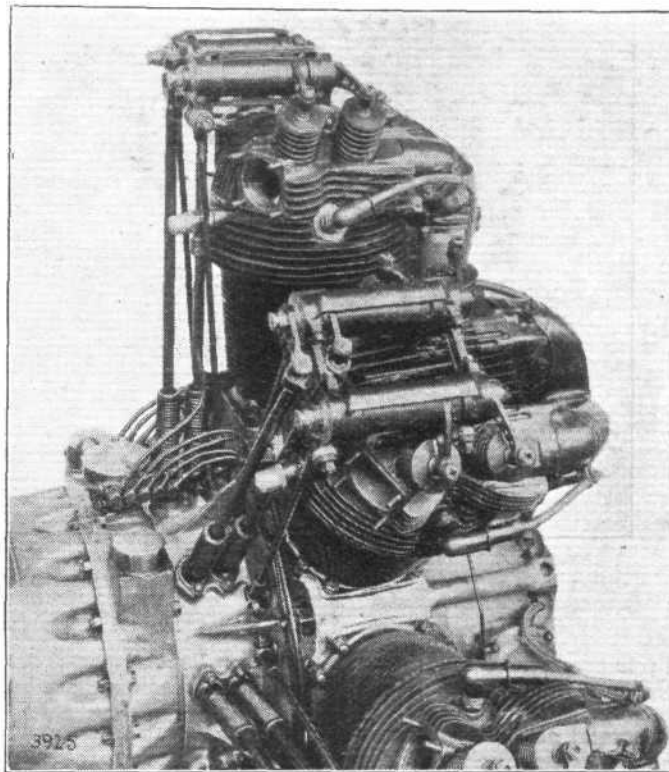
Armstrong-Siddeley "Mongoose."

BRISTOL

THE BRISTOL AEROPLANE CO., LTD.,

FILTON HOUSE, BRISTOL

THE nine-cylinder Bristol Jupiter air-cooled radial engine is so well known on the Continent as to require scarcely any introduction to our readers. Last year the company put into production a new series of engines which were first publicly shown at the International Exhibition at Olympia, London, in July. Three main types are available, these being the direct drive naturally aspirated engine, the direct drive supercharged engine and an unsupercharged geared engine. Each of these main types is available with various compression ratios to suit the different requirements of civil and military service. The distinctive features of these engines are the split forged duralumin crankcase body, the built up crankshaft, with integral type master-rod big end bearing fitted with a floating bush. The open-ended steel cylinder barrels have screwed to them a forged aluminium alloy head carrying four valves, of which the two exhaust valves are fitted at the front. The rocker bearing supports are fully compensated for temperature variation by an arrangement which forms a distinctive feature of these engines. All the auxiliaries and their driving gear are fitted at the rear. The geared engines have a 2:1 reduction gear of the Farman bevel epicyclic type. In addition to the main types previously mentioned there are available two other types which are both geared and supercharged, one type being suitable for high altitude military aircraft, whilst the other is generally similar but has a moderate supercharger. The geared and supercharged engines are each available in two forms, which differ only in the airscrew reduction gear ratio. The moderately supercharged engines are a new development, and are intended for use in general purpose military aircraft and commercial aircraft operating over mountainous districts in which landing grounds are situated at high altitudes. These engines are being fitted into the new four-engine machines now being constructed for the London Capetown service. The table on page 1339 gives further particulars of the various types and their performance characteristics.

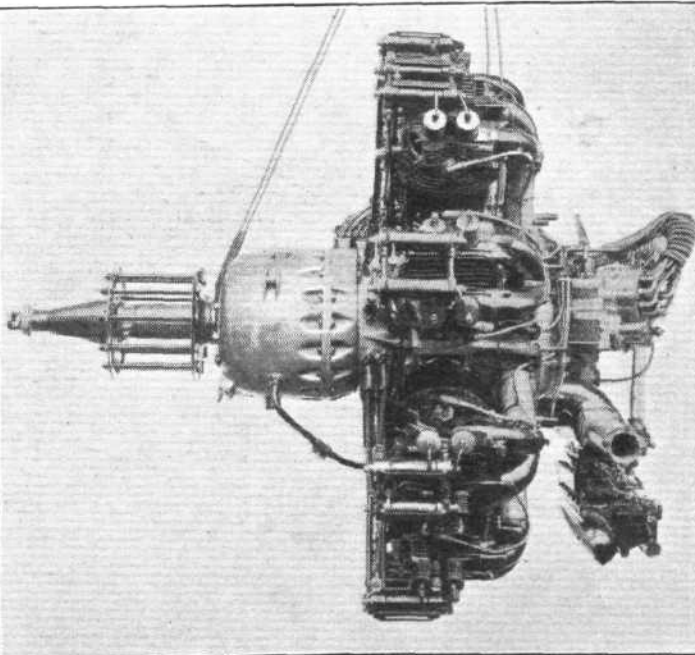
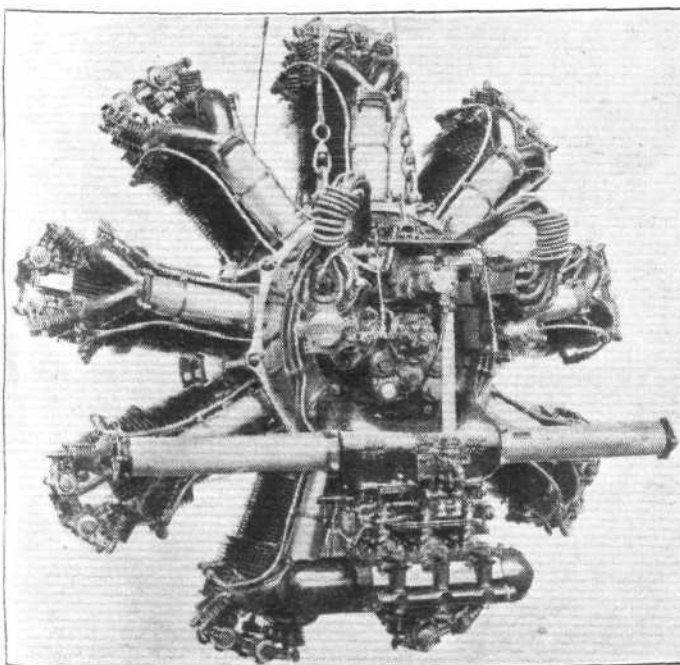


The F type cylinders used on all the latest Bristol engines.
Cylindres du type F employés dans la construction de tous les derniers moteurs Bristol.

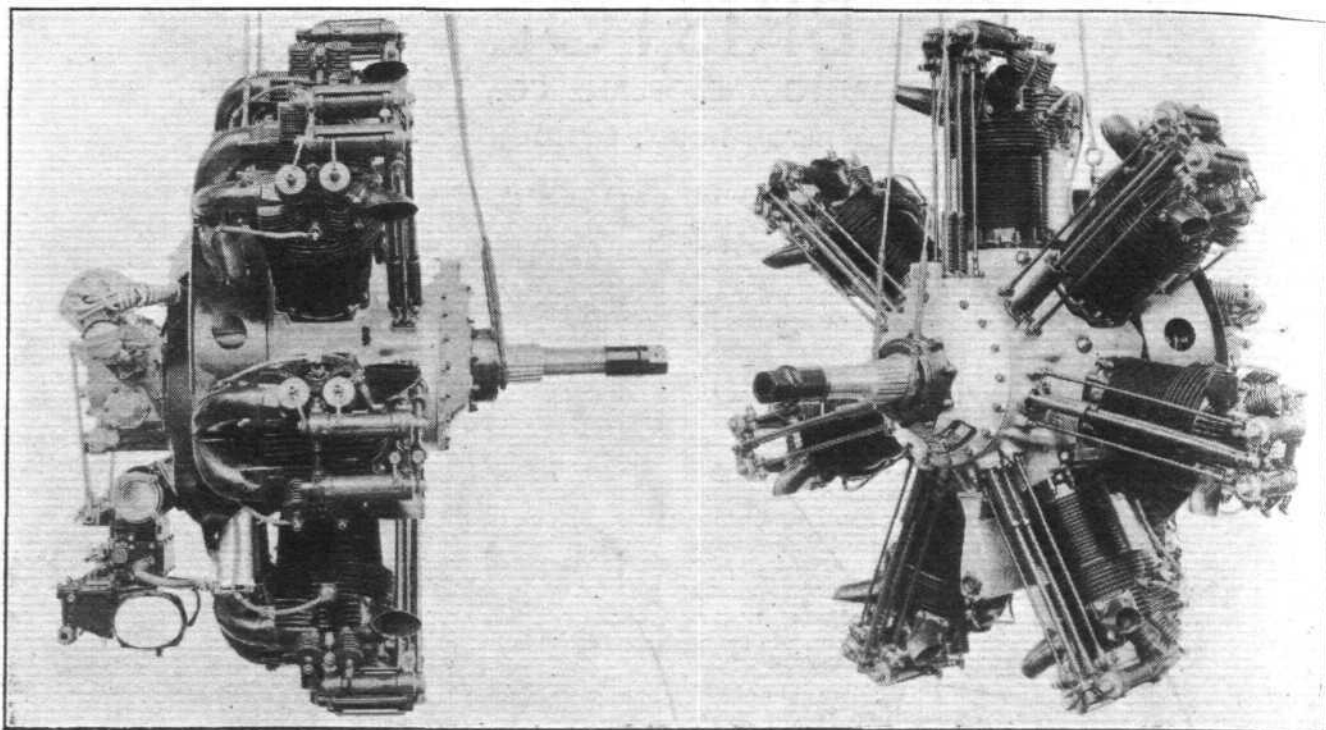
Los cilindros del tipo F usados en todos los últimos Motores Bristol.

LE neuf-cylindres en étoile Bristol Jupiter à refroidissement par air est si bien connu sur le Continent qu'il n'a guère besoin d'être présenté à nos lecteurs. L'année dernière la Compagnie mit en construction les nouveaux moteurs de la classe F, dont les premiers modèles figuraient à l'Exposition Aéronautique Internationale de Londres, qui se tint à l'Olympia en Juillet. Il en existe trois types : le moteur Série VI à prise directe et aspiration naturelle, le moteur Série VII à prise directe et suralimentation, et le

moteur Série VIII à démultiplication et aspiration naturelle. Chacun de ces trois types se construit avec différents taux de compression répondant aux diverses exigences des services civils et militaires. Les caractéristiques distinctives de tous ces moteurs de la Classe F sont : le carter moteur du type divisé en aluminium forgé, le vilebrequin composé, avec bielle maîtresse à tête d'une seule pièce garnie d'un coussinet du type bague flottante, et les fûts de cylindres ouverts au sommet, sur lesquels sont vissées des culasses en alliage d'aluminium forgé portant quatre soupapes, les deux soupapes



The Bristol geared Jupiter VIII F uses the new type of cylinder.
Le moteur démultiplié Jupiter VIII F Bristol comporte des cylindres du nouveau type.
El motor Bristol desmultiplicado Jupiter VIII F lleva el nuevo tipo de cilindro.

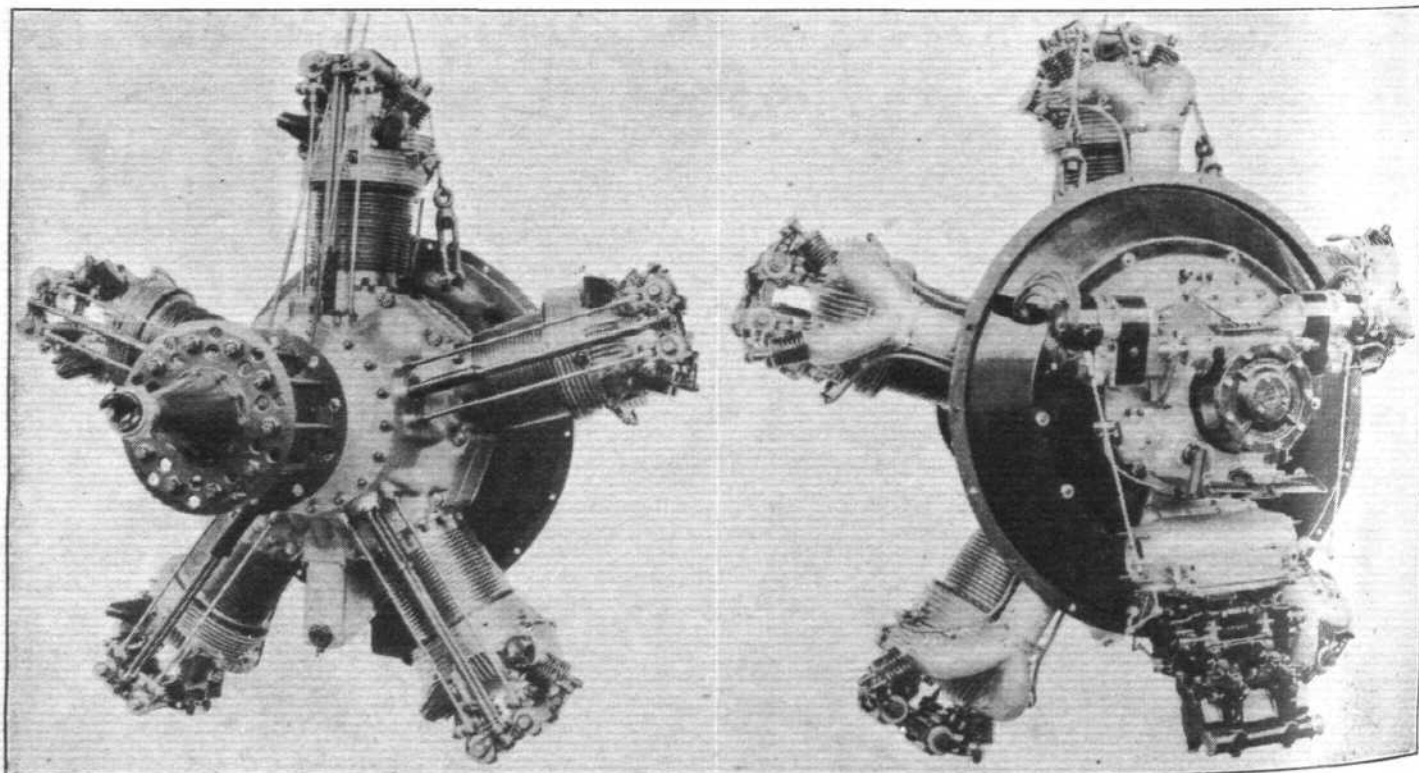


The Bristol Neptune uses the same cylinders as the Jupiter F
Le moteur Neptune Bristol comporte des cylindres pareils à ceux du Jupiter F.
El motor Bristol Neptune lleva los mismos cilindros que el Jupiter F.

d'échappement se trouvant à l'avant. Les supports des paliers de culbuteurs sont pleinement compensés contre les variations de température par un dispositif qui est caractéristique de ces moteurs. Tous les organes auxiliaires et leurs commandes sont disposés à l'arrière du carter. Le moteur démultiplié comporte un réducteur à demi-vitesse du type à satellites coniques Farman. Outre les trois types principaux déjà mentionnés il y a été ajouté récemment un quatrième dit Série X, qui est à la fois démultiplié et suralimenté. Ce dernier se construit en deux formes, dont l'une convient aux avions militaires destinés à opérer aux hautes altitudes, tandis que l'autre, semblable, est muni d'un suralimenteur à compression modérée. Les moteurs démultipliés et suralimentés pour hautes altitudes se fournissent en deux formes qui ne diffèrent que par le rapport de réduction de l'hélice. Les moteurs à suralimentation modérée, également représentés par deux types différant par le rapport de

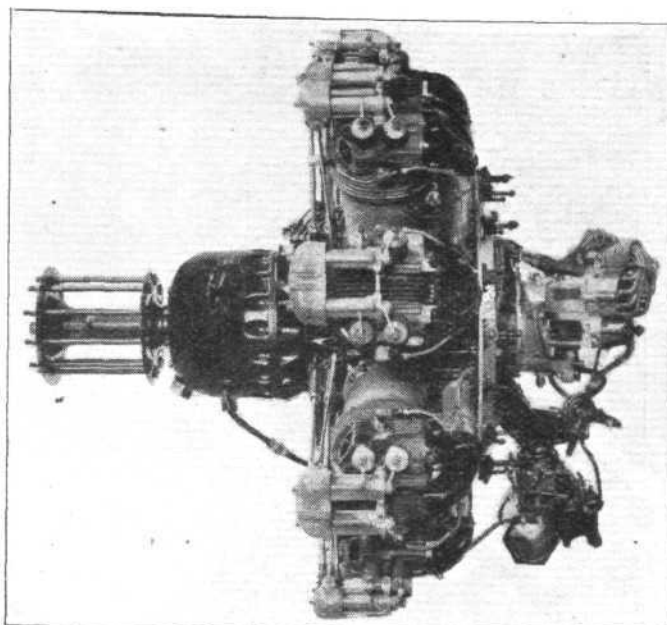
réduction, sont une innovation et sont destinés à être utilisés sur les avions militaires de service général et sur les appareils commerciaux appelés à survoler des régions montagneuses où les terrains d'atterrissage sont situés à de grandes altitudes. Ce sont ces moteurs qui équipent les nouveaux avions quadrimoteurs qui sont en construction en ce moment pour le service Londres-Capetown.

EL motor Bristol Jupiter de nueve cilindros estrellados con enfriamiento por aire, es tan conocido en el continente europeo, que casi no necesita ser presentado a nuestros lectores. El año pasado, la Compañía comenzó a construir los nuevos motores de la clase F, los primeros modelos de los cuales fueron expuestos en la Exposición Aeronáutica Internacional de Londres, que se celebró en Olympia en el mes de julio. Hay tres tipos principales: el motor Serie VI, de toma directa y aspiración natural, el motor Serie VII, de



The Bristol Titan is similar to the Neptune, but has five cylinders.
Le Titan Bristol est pareil au Neptune, sauf qu'il a cinq cylindres.
El motor Bristol Titan se asemeja al Neptune, pero tiene cinco cilindros.

toma directa con sobrealimentación, y el motor Serie VIII, desmultiplicado y sin sobrealimentación. Cada uno de estos tres tipos principales se construye con diferentes relaciones de compresión para responder a las distintas exigencias de los servicios civiles y militares. Las características distintivas de todos estos motores de la Clase F son: el carter de duraluminio forjado del tipo dividido, el cigüeñal compuesto, con biela maestra de cabeza en una sola pieza con cojinete del tipo de casquillo flotante, y los cuerpos de los cilindros de acero abiertos arriba, en los cuales están enroscadas culatas de aleación de aluminio forjada que llevan cuatro válvulas, de que las de escape están colocadas en la parte delantera. Los soportes de los cojinetes de los balancines están plenamente compensados contra las variaciones de temperatura por un dispositivo que es característico de esos motores. Todos los órganos auxiliares y sus mandos están dispuestos en la parte trasera del carter. El motor desmultiplicado tiene un reductor con la relación 2:1, del tipo de satélites-cónicos de Farman. A los tres tipos principales anteriormente mencionados se ha agregado recientemente un cuarto, llamado Serie X, que es a la vez desmultiplicado y sobrealimentado. Este motor se construye en dos formas: una indicada para aviones militares destinados a volar a grandes altitudes, y otra parecida, pero con sobrealimentador de compresión moderada. Los motores desmultiplicados y sobrealimentados para grandes altitudes se suministran en dos formas que no se diferencian sino en la relación de reducción de la hélice. Los motores con sobrealimentación moderada, también de dos tipos distinguidos por la relación de reducción, son una innovación y se destinan a los aviones militares de servicio general, y a los aparatos comerciales que tengan que volar sobre regiones montañosas en que los terrenos de aterrisaje están situados a grandes alturas. Son



Bristol "Jupiter" X.F.

estos motores los que van a montarse en los nuevos aeroplanos de cuatro motores, que ahora se están construyendo para el servicio Londres-Capetown.

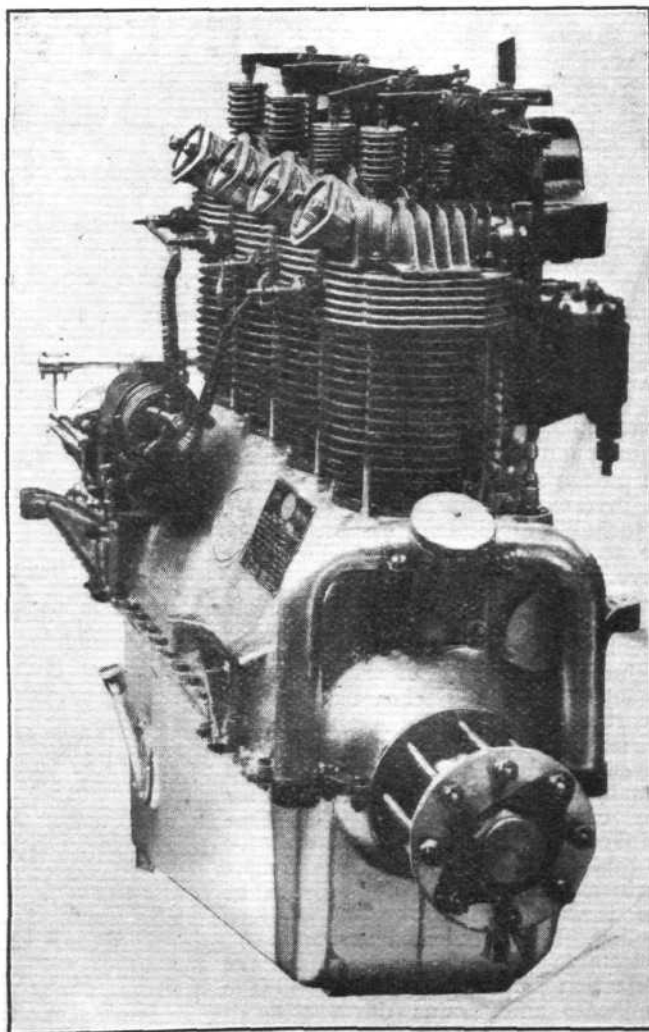
CIRRUS

CIRRUS AERO ENGINES, LTD.,

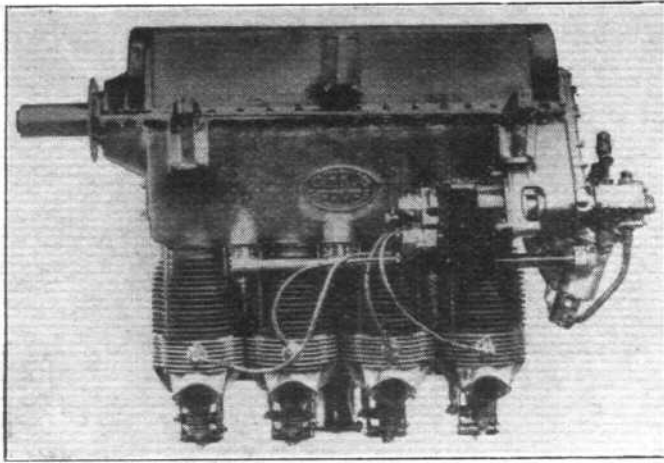
PURLEY WAY, WADDON, CROYDON, SURREY

CIRRUS four-cylinder in line air-cooled engines have during the past year been much in prominence in Continental light plane reliability tours, notably in the recent Polish circuit, when they secured first, second, fifth and sixth places. Their latest products include the 90-h.p. Cirrus Mark III, the 100-h.p. Hermes Mark II and an inverted version, the Hermes Mark IIB. The cast-iron cylinder barrels of these three engines are fitted with detachable aluminium alloy casting heads, which are secured to the crankcase by long bolts. The two valves in each cylinder head are rocker-actuated and are situated on the transverse centre line. The crankshaft is supported by five bearings, the two ends being of the roller type whilst the others are plain. An oil base crankcase is fitted in the case of the Cirrus and Hermes Mark II engines, but the inverted engine is of course of the dry sump type. A direct drive for the air screw is provided in each engine. Dual ignition is provided by two magnetos, an impulse starter being fitted to each to facilitate starting on either magneto.

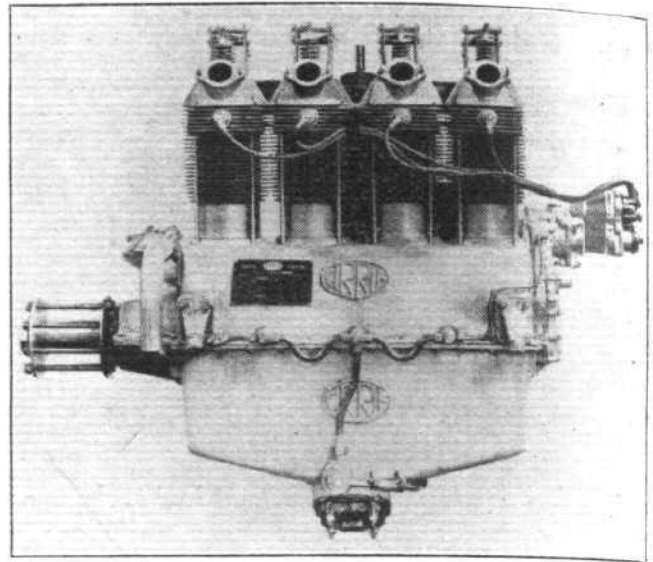
LES moteurs Cirrus à quatre cylindres en ligne et refroidissement par air ont figuré en vedette l'année dernière dans les raids continentaux d'endurance pour avions légers, et notamment dans le récent circuit polonais où ils se sont attribué les première, seconde, cinquième et sixième places. Les derniers produits de la Compagnie comprennent le Cirrus Marque III de 90 h.p., le Hermes Marque II de 100 h.p., et un exemplaire inversé, le Hermes Marque IIB. Les fûts en fonte des cylindres de ces trois moteurs sont coiffés de culasses amovibles en alliage d'aluminium moulé, qui sont assujetties au carter par de longs boulons. Les deux soupapes de chaque culasse sont actionnées par des tiges-poussoirs et des culbuteurs et sont situées sur l'axe transversal. Le vilebrequin est supporté par cinq paliers, ceux des extrémités étant du type à rouleaux tandis que les autres sont lisses. Le fond du carter sert de réservoir d'huile dans les moteurs Cirrus et Hermes Marque II, mais le moteur inversé est, naturellement, du type à vidange constante du carter inférieur. La commande de l'hélice est à prise directe dans tous ces moteurs. L'allumage double est assuré par deux magnétos, qui sont munies chacune d'un dispositif de lancement à déclic pour faciliter le démarrage avec l'une ou l'autre des magnétos.



The Cirrus Hermes II.



The Hermes inverted engine.
Le moteur Hermes inversé.
El motor Hermes invertido.



The Cirrus III.

LOS motores Cirrus de cuatro cilindros alineados, con enfriamiento por aire, se han señalado mucho en el curso del año en los vuelos continentales de duración para aviones ligeros, notablemente en el reciente circuito polaco, donde ocuparon el primer, segundo, quinto y sexto lugar. Los últimos productos de la casa comprenden el Cirrus Marca III de 90 c. de f., el Hermes Marca II de 100 c. de f. y un modelo invertido, el Hermes Marca IIB. Los cuerpos de hierro fundido de los cilindros de estos tres motores llevan culatas desmontables de aleación de aluminio fundida que están aseguradas al carter por pernos largos. Las dos válvulas en cada culata son accionadas por varillas de levantamiento

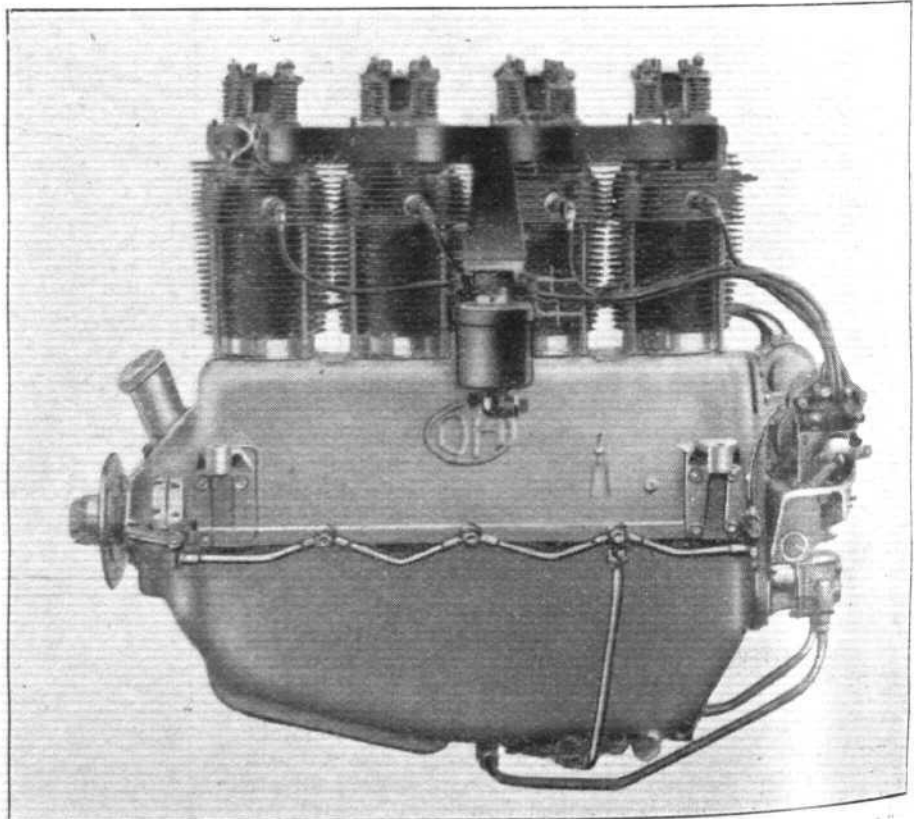
y balancines y están situadas en el eje transversal. El cigüeñal gira en cinco cojinetes, siendo los de las extremidades del tipo de rodillos y los otros sencillos. El fondo del cárter sirve de colector de aceite en los motores Cirrus y Hermes Marca II, pero el motor invertido es naturalmente del tipo de colector seco. El accionamiento de la hélice es por toma directa en todos estos motores. El encendido doble se verifica por medio de dos magnetos, provistas cada una de un impulsor para facilitar la puesta en marcha con una u otra magneto.

DE HAVILLAND

THE DE HAVILLAND AIRCRAFT CO., LTD.,

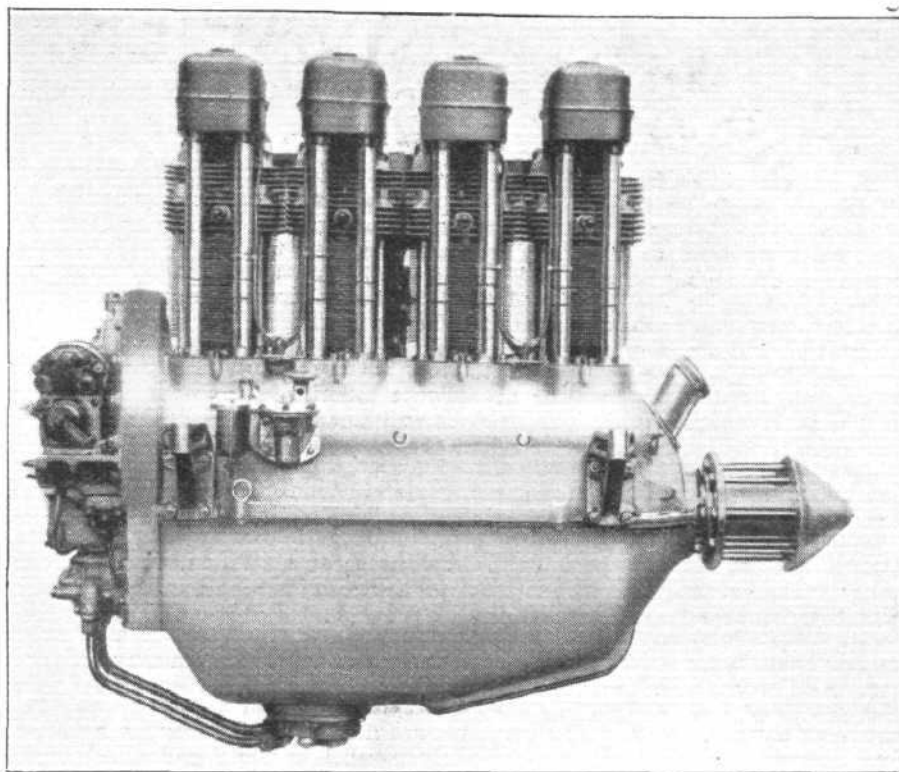
STAG LANE AERODROME, EDGWARE, MIDDLESEX

THE Gipsy engine built by the De Havilland Aircraft Co., the makers of the famous Moth aeroplanes, is well known on the Continent, but has particularly distinguished itself in the recent England-Australia flights, particularly that of Kingsford Smith. Three models are available, all being of the air-cooled four-cylinder in line type. The Gipsy I is rated at 100 h.p. and the Gipsy II and III models at 120 h.p., the latter being an inverted version of the Gipsy II. Detachable aluminium cylinder heads are secured by long bolts, which also serve to secure the cast-iron barrels to the crankcase. Two valves per cylinder are employed, these being arranged side by side on the port side of the engine in the case of the I and II models, but at the starboard side on the inverted engine. The crankshaft is carried in five plain bearings; an unusual feature of this engine is that aluminium Y-alloy forgings are used for the connecting rods. An oil base crankcase, containing sufficient oil for 15 hrs. flying, is fitted in both upright engines, external fins being provided at the forward end to ensure efficient cooling. In the inverted engine the oil collects in the space formed by the projection of the cylinders into the crankcase and drains down through suitable piping to the oil tank. Dual ignition is provided by two magnetos



The De Havilland Gipsy I.

mounted transversely at the rear of each engine, these being driven through flexible vernier couplings; an impulse starter is fitted to one of the magnetos. An exhaust jacketed square-section steel induction manifold is fitted to each engine. A Zenith carburettor is employed on the 100 h.p. engine, but both larger engines are fitted with a Claudel-Hobson carburettor.

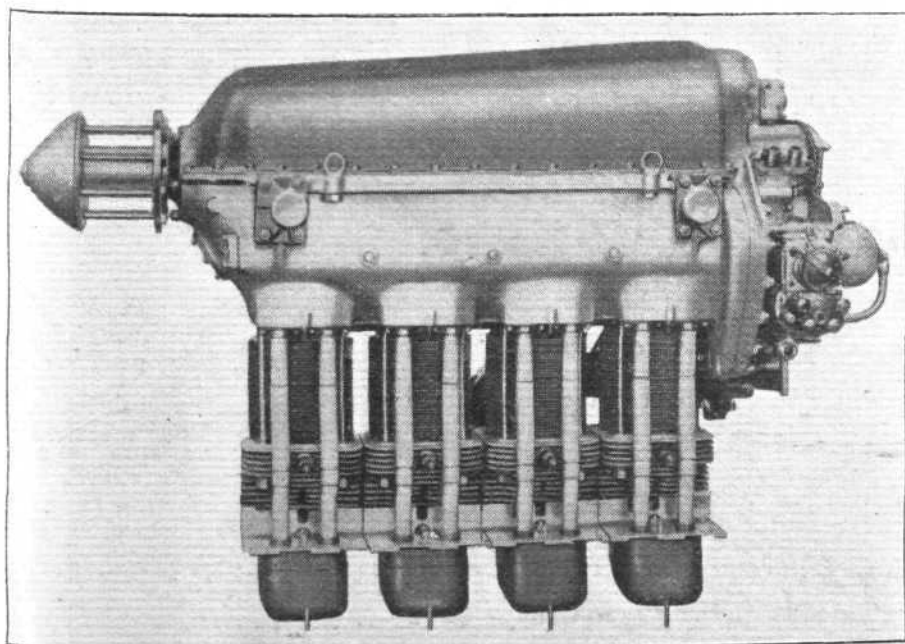


The De Havilland Gipsy II.

Le moteur Gipsy, construit par la De Havilland Aircraft Co., qui construit aussi les fameux avions Moth, est bien connu sur le Continent, mais il s'est particulièrement distingué dans les récents vols d'Angleterre en Australie, spécialement celui de Kingsford Smith. Il en existe trois modèles, qui sont tous du type à quatre cylindres en ligne refroidis par l'air: le Gipsy I a une puissance nominale de 100 h.p., et les modèles Gipsy II et III, de 120 h.p., ce dernier n'étant qu'un exemplaire inversé du Gipsy II. Les culasses amovibles en aluminium sont fixées au moyen de longs boulons qui servent aussi à assujettir au carter les fûts en fonte des cylindres. Il y a deux soupapes par cylindre, disposées côte à côte sur la gauche du moteur dans le cas des modèles I et II, mais sur la droite dans le cas du moteur inversé. Le vilebrequin est supporté par cinq paliers lisses, et, caractéristique de ce moteur qui sort de l'ordinaire, les bielles sont des pièces de forge en alliage Y d'aluminium. Les deux moteurs droits ont un carter réservoir d'huile contenant une provision suffisante pour quinze heures de vol, carter dont le fond est muni de l'avant d'ailettes destinées à assurer un refroidissement efficace de l'huile. Dans le moteur inversé l'huile se rassemble dans l'espace formé par la projection des cylindres dans le carter et se rend de là au réservoir d'huile par une tuyauterie appropriée. L'allumage double est assuré par deux magnétos montées transversalement à l'arrière de chaque moteur, qui sont entraînées par l'intermédiaire d'acouplements flexibles à vernier; l'une des magnétos est à déclat. Le collecteur d'admission de chacun de ces moteurs est en acier de section carrée et entouré par l'échappement. Un carburateur Zenith est employé sur le moteur de 100 h.p., mais les deux plus grands modèles sont munis de carburateurs Claudel-Hobson.

El motor Gipsy, construido por la De Havilland Aircraft Co., que construye también los famosos aeroplanos Moth, es bien conocido en el continente europeo, pero se ha distinguido particularmente en los recientes vuelos de Inglaterra a Australia, especialmente en el de Kingsford-Smith. Hay tres modelos, todos del tipo de cuatro cilindros en línea con enfriamiento por aire. El Gipsy I tiene la potencia nominal de 100 c. de f. y los modelos Gipsy II y III la de 120 c. de f. siendo este último una variante invertida del Gipsy II. Las culatas desmontables de aluminio están aseguradas por pernos largos, que también sirven para sujetar los cuerpos de hierro fundido de los cilindros al cárter. Hay dos válvulas por cilindro, dispuestas una al lado de la otra a la izquierda del motor, en el caso de los modelos I y II, y a la derecha en el caso del motor invertido. El cigüeñal gira en cinco cojinetes sencillos, y una característica original de este motor es que las bielas son piezas forjadas de aleación Y de aluminio. Los dos motores rectos tienen un cárter cuyo fondo sirve de depósito de aceite, de que puede contener suficiente para quince horas de vuelo.

En la parte delantera de este cárter hay aletas exteriores destinadas a asegurar un enfriamiento eficaz del aceite. En el motor invertido, el aceite se recoge en el espacio formado por la proyección de los cilindros en el cárter, de donde va al depósito de aceite por una tubería adecuada. El encendido doble se efectúa por dos magnétos montadas transversalmente en la parte trasera de cada motor y accionadas por medio de acoplamiento flexibles de vernier. Una de estas magnétos tiene un impulsor. El colector de admisión de cada motor, de sección cuadrada, es de acero y tiene una camisa por la cual pasan los gases quemados. El carburador del motor de 100 c. de f. es del tipo Zenith, pero los dos modelos más grandes tienen carburadores Claudel-Hobson.



The De Havilland Gipsy III is similar to the Gipsy II, but is inverted.
Le moteur Gipsy III De Havilland est pareil au Gipsy II, mais inversé.
El motor De Havilland Gipsy III es parecido al Gipsy II, pero es invertido.

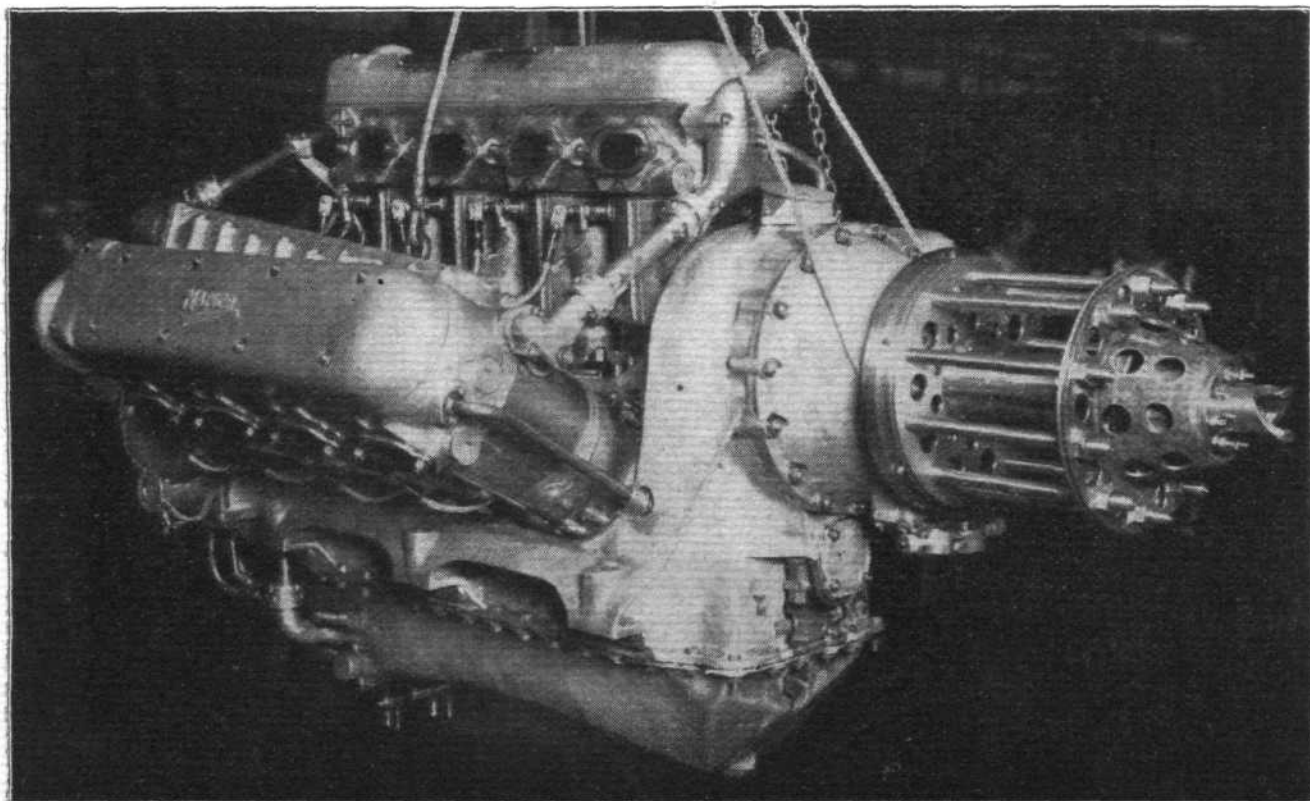
NAPIER

D. NAPIER & SON, LTD.,

ACTON, LONDON, W.3

THE makers of the famous Lion engine are now concentrating chiefly on their Series XI type, this being the engine which made the first and only non-stop flight, to date, from England to India. This engine is also the ancestor of the racing type Series VII D, an earlier version of which, the Series VII B, wrested the Schneider Trophy from Italy and also enabled the late Sir Henry Segrave to capture the land speed record of 231 m.p.h. As originally developed, the Lion type was rated at 400 h.p., but by steady attention to detail and refinement in design the Series XI has now reached a rating of 530 h.p. As is well known, this engine is of the water-cooled twelve-cylinder type in which the cylinders are arranged in three banks of four, commonly known as the W arrangement. The forged steel cylinders of each row are secured to a common aluminium head casting in which the twin camshafts are mounted. The lower portions are individually jacketed by welded sheet steel casings. The crank-case is in two main portions, and supports the crankshaft in five roller bearings and one plain bearing situated forward of the reduction gear pinion, the airscrew shaft being driven by a plain spur wheel type of gear. All the auxiliary drives, the carburettors and the magnetos, are located at the rear of the engine. In the case of the racing engines, however, the magnetos are fitted at the front, one on each side and approximately parallel to the airscrew shaft, which in these engines is driven through a lay-shaft form of reduction gear to bring the airscrew shaft into alignment with the crankshaft. A point of particular interest respecting the latest racing engine, the VII D, is that its output is over 59 h.p. per litre of cylinder capacity, this being the highest yet attained in any engine, it being approximately three times that obtaining in most normal types of aero engines. An entirely new departure in aero engine design now being experimentally developed by this firm is a supercharged 300-h.p. sixteen-cylinder air-cooled engine of very compact arrangement, the cylinders being in H formation, i.e., in two parallel rows of four above and below the crankcase. As this engine, the Rapier, is still in the development stage, it is not possible to give any further details other than those contained in the accompanying table. The engine is being developed for use in commercial aircraft as well as for service use.

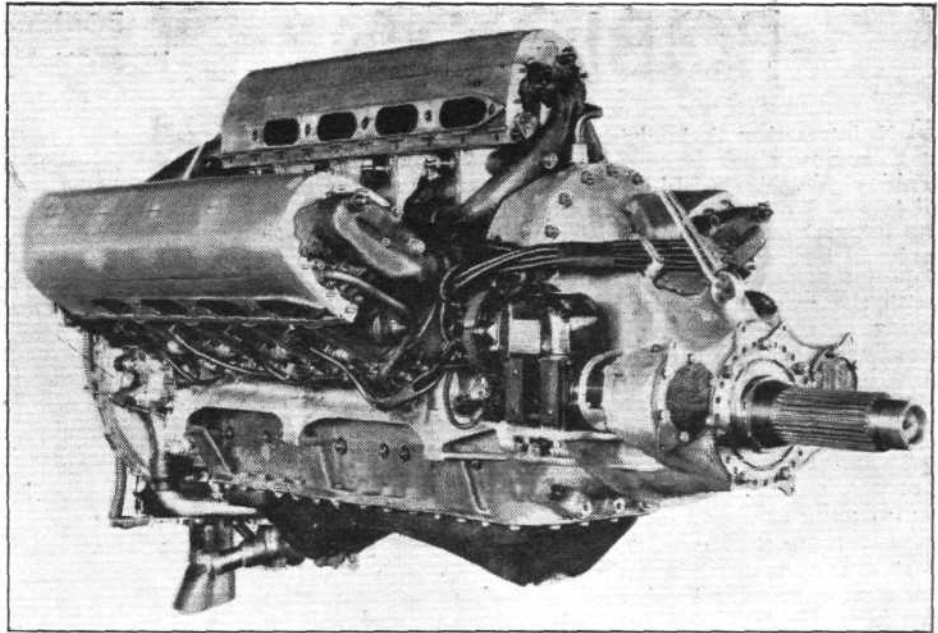
LES constructeurs du fameux moteur Lion se concentrent aujourd'hui principalement sur le type dit Série XI; c'est ce moteur qui a accompli le premier, et jusqu'ici le seul, vol sans arrêt d'Angleterre aux Indes. Il est aussi l'ancêtre du fameux moteur de course Série VII D, dont une ancienne édition, le Série VII B, a ravi à l'Italie la Coupe Schneider et a aussi permis au regretté Sir Henry Segrave de capturer le record de la vitesses sur terre à 372 km. à l'heure. Sous sa forme primitive le type Lion avait une puissance nominale de 400 h.p., mais par des soins incessants apportés aux détails et par le raffinement du dessin la puissance du moteur Série XI est portée aujourd'hui à 530 h.p. Comme on le sait, ce moteur est du type à douze cylindres refroidis par l'eau, et les cylindres sont disposés en trois rangées de quatre, en W comme on dit. Les cylindres, en acier forgé, de chaque rangée sont reliés à une culasse commune en aluminium moulé dans laquelle sont montés les arbres à cames jumelés. Les portions inférieures sont chacune entourées d'une chemise en tôle d'acier soudée. Le carter moteur est en deux parties principales et supporte le vilebrequin par cinq paliers à rouleaux et un palier lisse situé en avant du pignon de réducteur, l'arbre porte-hélice étant entraîné par un train d'engrenages du type cylindrique simple. Toutes les commandes auxiliaires, ainsi que les carburateurs et les magnétos, se trouvent à l'arrière du moteur. Toutefois les moteurs de course ont leurs magnétos à l'avant, une de chaque côté, et approximativement parallèles à l'arbre d'hélice qui, dans ces moteurs, est entraîné par une forme de réducteur à arbre intermédiaire ayant pour but de ramener l'arbre d'hélice en ligne avec le vilebrequin. Un point d'intérêt particulier, en ce qui a trait au dernier moteur de course type VII D, c'est qu'il débite 59 h.p. par litre de cylindrée; c'est la plus grande puissance spécifique réalisée jusqu'ici dans un moteur: elle est approximativement trois fois plus grande que celle de la plupart des types normaux de moteurs d'aviation. Une orientation complètement nouvelle dans la construction des moteurs d'aviation vient d'être mise à l'étude par la maison Napier, qui est en train de soumettre à des expériences un moteur de 300 h.p. à seize cylindres refroidis par l'air d'une grande compacité, dans lequel les cylindres sont disposés en H, c'est-à-dire en deux rangées parallèles de quatre au-dessus et au-dessous du carter. Ce moteur, le Rapier, étant encore à l'étude, il n'est pas possible



The Napier "Lion."

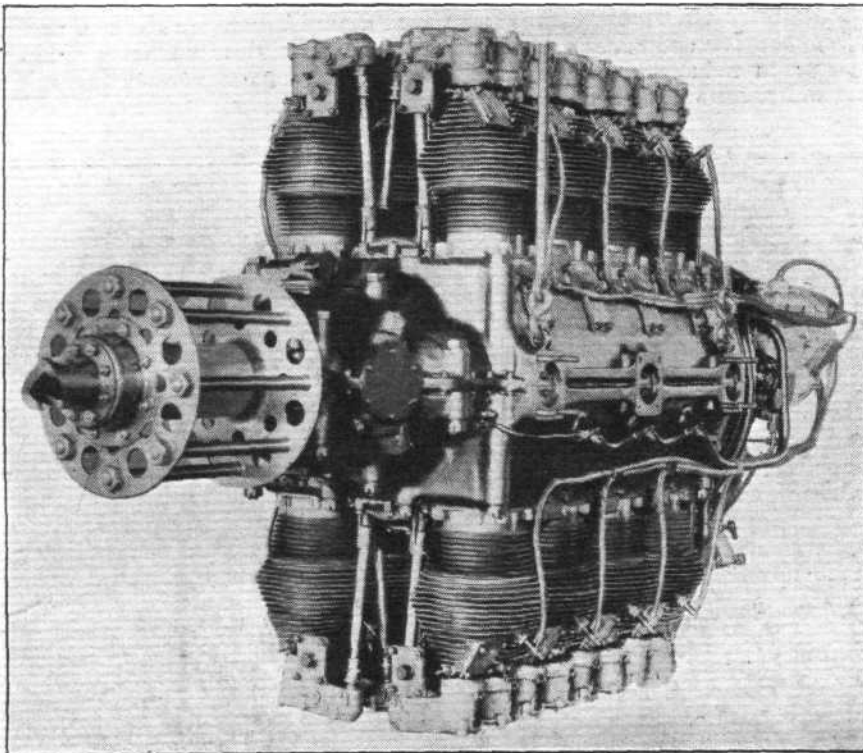
de donner à son sujet d'autres détails que ceux du tableau ci-après. Il est destiné à être utilisé sur les avions commerciaux aussi bien que sur les appareils militaires.

LOS constructores del famoso motor Lion están concentrando sus esfuerzos ahora principalmente sobre el tipo llamado Serie XI. Es éste el motor con que se ha hecho el primer, y hasta ahora el único, vuelo sin parada de Inglaterra a la India. Este motor es también el predecesor del famoso motor de carrera, Serie VII D, una variante anterior de la cual, la Serie VII B, arrancó a Italia el Trofeo Schneider y también permitió al finado Sir Henry Segrave establecer el record de la velocidad en tierra de 372 k.p.h. En su forma primitiva, el tipo Lion tenía una potencia nominal de 400 c. de f., pero por el perfeccionamiento incesante de todos sus detalles y el refinamiento de su concepción, la potencia del motor Serie XI ha sido llevada hoy a 530 c. de f. Sabido es que este motor es del tipo de doce cilindros con enfriamiento por agua, con los cilindros montados en tres hileras de cuatro, según la llamada disposición en W. Los cilindros, de acero forjado, de cada hilera están unidos a una culata común de aluminio fundido, en la cual están montados los árboles de levas gemelos. Las partes inferiores tienen cada una una camisa de palastro de acero soldado. El cárter está dividido en dos partes principales y sostiene el cigüeñal por medio de cinco cojinetes de rodillos y un cojinete sencillo situado delante del piñón del reductor, siendo movido el eje de la hélice por un tren de engranajes del tipo cilíndrico sencillo. Todos los mandos auxiliares, así como también los carburadores y las magnetos, están situados en la parte trasera del motor. En el caso de los motores de carrera, sin embargo, las magnetos están colocadas delante, uno a cada lado, y aproximadamente paralelas al eje de la hélice, que en estos motores es movido por una forma de reductor de árbol intermedio que tiene por oficio poner el eje de la hélice en línea con el cigüeñal. Un punto de particular interés en lo



The Napier VII D is a racing engine.
Le Napier VII D est un moteur de course.
El Napier VII D es un motor de carrera.

que se refiere al último motor de carrera del tipo VII D, es que desarrolla más de 95 c. de f. por litro de cilindrada, siendo este rendimiento el más alto alcanzado hasta ahora con cualquier motor y aproximadamente tres veces el obtenido con la mayoría de los motores de aviación corrientes. Ahora esta casa va a seguir un camino del todo diferente en la construcción de motores de aviación y ya está haciendo experimentos con un motor de dieciséis cilindros, de 300 c. de f., con enfriamiento por aire y sobrealimentación, de construcción muy compacta, estando los cilindros dispuestos en H, o sea en dos hileras paralelas de cuatro, encima y debajo del cárter. Como este motor—el Rapier—está todavía en vía de estudio, no es posible dar más detalles que los contenidos en la tabla que sigue. Se destina a ser montado en los aviones comerciales, así como en los aparatos militares.



The Napier "Rapier" is a 16-cylinder air-cooled of H formation.
Le Napier "Rapier" est un moteur à 16 cylindres disposés en H à refroidissement par air.
El Napier "Rapier" es de 16 cilindros dispuestos en H, con enfriamiento por aire.

POBJOY

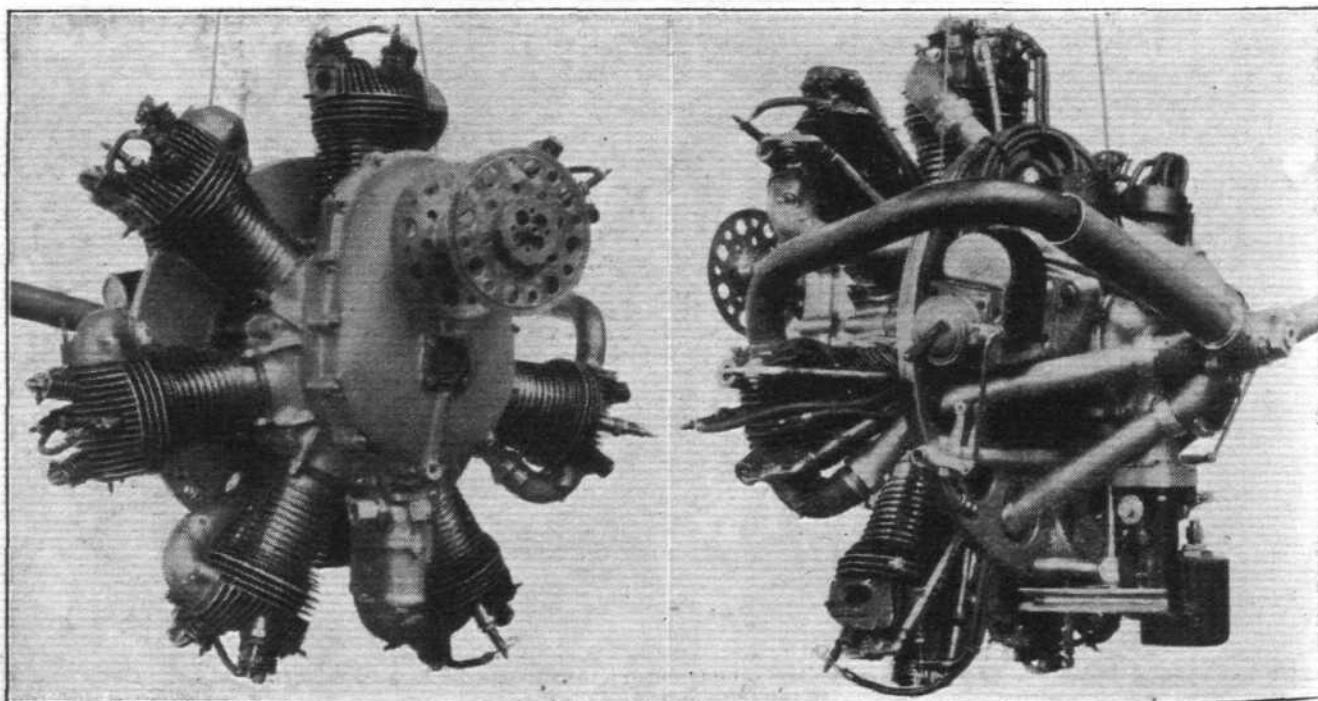
AN interesting little light plane air-cooled geared radial engine which is now being produced in quantities by Pobjoy Airmotors, Ltd., is the new seven-cylinder 80-h.p. R type. A remarkable feature about this engine is that with its integral mounting, oil cooler and self starter, it weighs only 59 kg., and has an overall diameter of 647 mm. An unusual feature is that the airscrew shaft is not co-axial with the crankshaft axis, but is raised, the reduction gear being of the silent double-helical spur wheel type. Cast duralumin heads are screwed to the steel cylinder barrels, two inclined valves being fitted in each case; the rocker pivots are carried in ball bearings. The crankcase is of the split type, the timing gear and tappets being housed in the rear portion, whilst one-half of the reduction gear case is formed integral with the front portion, which also carries the rear bearing for the airscrew shaft. The crankshaft is of the built-up type supported by roller bearings, an unusual feature being that a small flywheel is secured to the front end. The flywheel is hollow and serves as a centrifugal oil separator. The lubrication supply and scavenge pumps are conveniently fitted as a self-contained detachable unit to the base of the front portion of the crankcase. A special feature of the lubrication system of this engine is the entire absence of oil pipes. The carburettor supplies mixture to the centre of an exhaust-heated distribution spider from which the induction pipes lead to the sides of the cylinder heads. The two magnetos are mounted transversely at the rear of the engine behind the mounting plate.

UN intéressant petit moteur en étoile à réducteur, refroidi par air, produit aujourd'hui en grande série par la société Pobjoy Air Motors, Ltd., c'est le nouveau sept-cylindres type R, de 80 h.p. Sa caractéristique la plus remarquable est le fait qu'il ne pèse que 59 kilogrammes avec pattes de montage solidaires, refroidisseur d'huile et démarreur automatique; son diamètre hors tout n'est que de 647 millimètres. Il présente aussi une particularité sortant de l'ordinaire, c'est que l'arbre porte-hélice n'est pas dans le prolongement de l'axe du vilebrequin, mais occupe une position surélevée, le réducteur étant du type à engrenages cylindriques silencieux à chevrons. Les culasses, en duralumin moulé, sont vissées dans les fûts en acier des cylindres et portent chacune deux soupapes inclinées; les pivots des culbuteurs sont portés par des roulements à billes. Le carter du moteur est du type divisé, la portion arrière logeant les engrenages de la distribution et les poussoirs des soupapes, tandis qu'une moitié du carter du réducteur est venue de fusion avec la portion avant, qui porte aussi le palier arrière

POBJOY AIR MOTORS, LTD.,
HOOTON PARK AERODROME, CHESHIRE

de l'arbre d'hélice. Le vilebrequin est du type composé et est supporté par des paliers à rouleaux, et il présente la particularité peu ordinaire d'avoir un petit volant calé sur son extrémité avant. Ce volant est creux et fonctionne comme séparateur d'huile centrifuge. Les pompes de graissage et de vidange du carter sont commodément réunies en un groupe amovible fixé à la base de la portion antérieure du carter. Une particularité du système de graissage de ce moteur, c'est l'absence entière de tuyaux à huile. Le carburateur débite le mélange au centre d'un croisillon de distribution réchauffé par l'échappement d'où partent des tuyaux d'aspiration aboutissant aux côtés des culasses. Les deux magnétos sont montées transversalement à l'arrière du moteur derrière la tôle de montage.

UN interesante motor pequeño en estrella desmultiplicado con enfriamiento por aire para aviones ligeros que está produciendo ahora en gran cantidad la casa Pobjoy Air Motors, Ltd., es el nuevo tipo R, de siete cilindros, de 80 c. de f. Lo que más distingue este motor es que no pesa más que 59 kg. con patas de montaje solidarias, refrigerador de aceite y arrancador automático, y que su diámetro total es solamente de 647 mm. Tiene además de particular el que el eje de la hélice no está en prolongación del eje del cigüeñal, sino que está descentrado hacia arriba. El reductor es del tipo de ruedas silenciosas con dientes angulares. Las culatas de duraluminio fundido están enroscadas en los cuerpos de acero de los cilindros y llevan cada una dos válvulas inclinadas. Los pivotes de los balancines descansan en cojinetes de bolas. El cárter es del tipo dividido, estando alojados en la parte trasera los engranajes de la distribución y las varillas de levantamiento de las válvulas, en tanto que una mitad de la caja del reductor forma cuerpo con la parte delantera, que lleva también el cojinete trasero del eje de la hélice. El cigüeñal es del tipo compuesto y gira en cojinetes de rodillos. Una particularidad de este cigüeñal es que lleva un pequeño volante calado en la extremidad delantera. Este volante es hueco y hace el oficio de separador centrífugo de aceite. Las bombas de lubricación y de vaciado del cárter reunidas en un grupo íntegro desmontable, están convenientemente fijadas a la base de la parte delantera del cárter. Una particularidad del sistema de lubricación de este motor es la entera ausencia de tubos de aceite. El carburador suministra la mezcla al centro de una araña de distribución, calentada por el escape, de la cual parten los cubos de admisión que van a parar a los costados de las culatas. Las dos magnetos están montadas transversalmente en la parte trasera del motor, detrás de la placa de montaje.



Deux vues du moteur Pobjoy.

Two views of the Pobjoy engine.

Dos vistas del motor Pobjoy.

ROLLS-ROYCE

ROLLS-ROYCE, LIMITED,

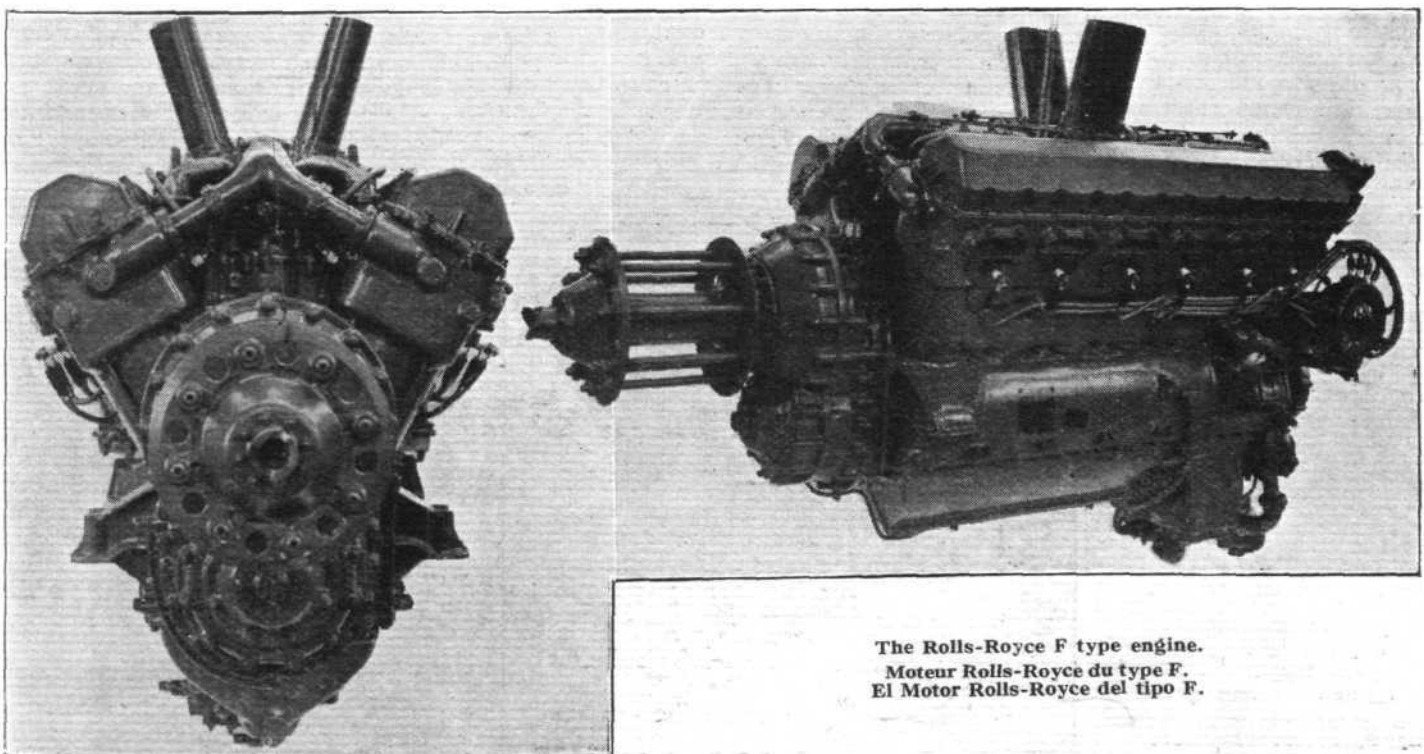
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LONDON OFFICE:
14-15, CONDUIT STREET, W.1

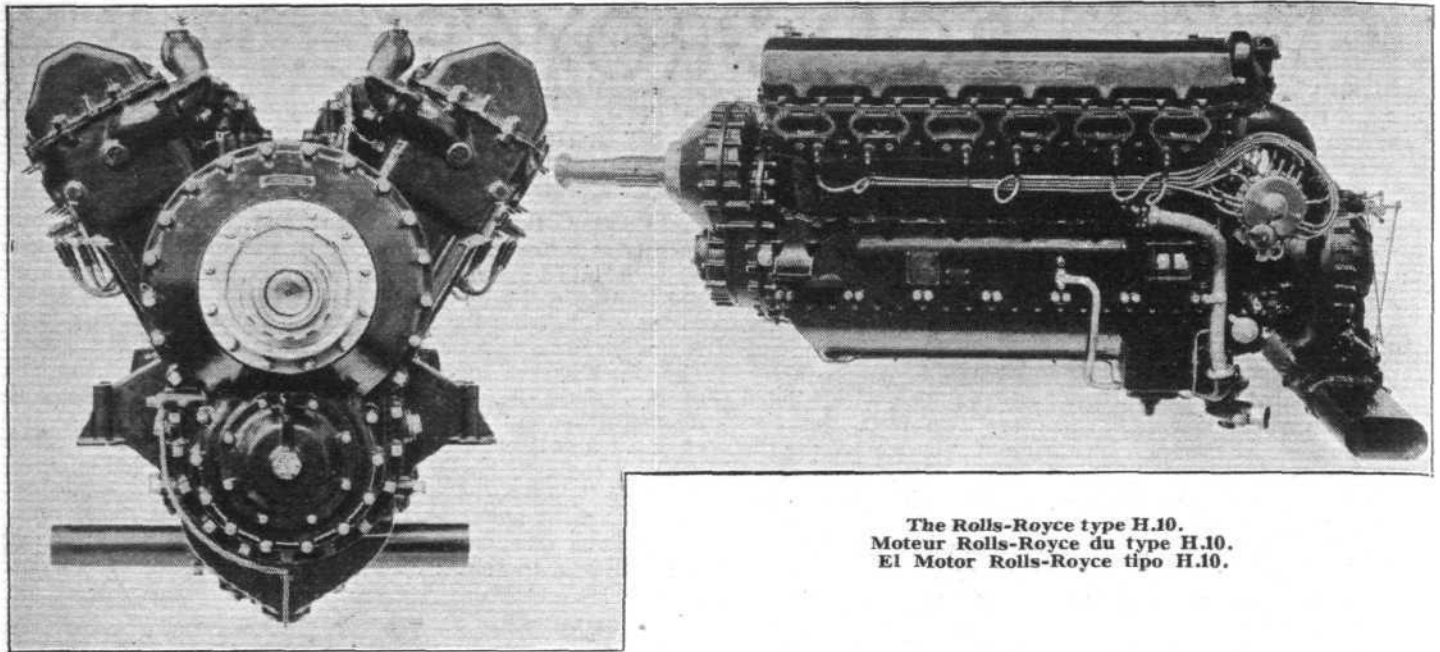
THE engines mainly in production at the present time by this pioneering firm among British aero engine builders are the Condor III B and the various types of the new F and H Series. All are of the water-cooled 60° V type, but the F and H engines are of entirely different design and are chiefly distinguished from the earlier engine in having their banks of cylinders in blocks instead of separately. The cylinders of the Condor are each provided with welded sheet steel water jackets. There are two inlet and two exhaust valves per cylinder, each bank of cylinders having the valves operated by a single camshaft. Three cams are provided over each cylinder head, the central cam operating two rocker arms, whilst the outer cams operate one rocker arm each. The camshaft drive is taken through inclined shafts fitted at the rear of the cylinders, a friction-damped spring drive being provided to relieve the driving gear from the irregularities caused by crankshaft vibration. The air-screw shaft is driven through a straight spur type of gear. The magnetos are mounted transversely at the rear of the engine, with the contact breakers facing outwards. The crankshaft is carried in the two-piece crankcase in seven white-metal bearings. The F type engines are available in twelve varieties, all incorporating the same main components. These twelve are sub-divided into three further types, according to the reduction gear ratio, and for each ratio there are two engines having different compression ratios. Alternatively one of two types of supercharger may be fitted, one being known as the moderate type and permitting a supercharge at ground level, whilst the other is for high altitude use and permits the ground level rating to be maintained up to the rated altitude. The series numbers II, XII and XIV indicate the different gear ratios and the letters A or B indicate the low or high compression ratio, whilst the further letters MS or S indicate whether the engine is fitted with a moderate supercharger or a full supercharger. The H type engine, which is of larger size than the F, is supplied with a supercharger which can be used to facilitate taking off. Two gear ratios are also available, the engines being known as the H XII MS and the H XIV MS. The cylinder blocks of the F and H types are aluminium castings to which the integral head casting is secured by long bolts, which secure the whole to the crankcase. Four valves per cylinder are provided, the two rows being operated by a single camshaft through separate rocker arms. The camshafts are driven through a spring drive similar in effect to that used on

the Condor, though of different construction. The connecting rods are of the forked type, the split rod carrying a white-metalled bearing, which occupies the whole length of the crank pin. This is covered externally with white metal to form a bearing for the other rod fitted within the fork. A single spur reduction gear is fitted to all F and H engines. The supercharged engines carry the supercharger at the end of the crankcase, where it is very neatly arranged. The magnetos are mounted transversely, also at the rear of the engine. Two Rolls-Royce duplex carburettors are mounted between the cylinder blocks of the non-supercharged engines, the four throttles being geared together to open simultaneously. The superchargers fitted are of the centrifugal rotor type driven through spur gearing. The gears are provided with a special friction drive to prevent damage due to sudden throttle movement.

LES principaux moteurs que construit actuellement cette maison d'avant-garde parmi les constructeurs britanniques de moteurs d'aviation sont le Condor III B et les divers types des nouvelles Séries F et H. Ce sont tous des moteurs du type en V à 60° refroidis par l'eau, mais ceux des Séries F et H sont de construction entièrement différente et se distinguent de leurs prédécesseurs principalement en ce que les cylindres de chaque rangée sont moulés en bloc au lieu d'être séparés. Les cylindres du Condor ont chacun une chemise d'eau en tôle d'acier soudée. Il y a deux soupapes d'admission et deux d'échappement par cylindre, chaque groupe de cylindres ayant ses soupapes actionnées par un arbre à cames unique. À chaque culasse correspondent trois cames : une came centrale qui commande deux culbuteurs, et deux cames extrêmes actionnant chacune un culbuteur. L'arbre à cames reçoit sa commande d'arbres inclinés placés à l'arrière des cylindres, avec intercalation d'un accouplement à ressort amorti par friction destiné à isoler le mécanisme de distribution des irrégularités dues aux vibrations du vilebrequin. L'arbre de l'hélice est entraîné par un réducteur du type à engrenages droits de renvoi. Les magnétos sont montées transversalement à l'arrière du moteur, avec leurs rupteurs tournés vers l'extérieur. Le vilebrequin est supporté dans le carter en deux pièces par sept paliers lisses garnis de métal blanc. Les moteurs type F se construisent en douze variétés, comportant toutes les mêmes organes constitutifs principaux. Ces douze



The Rolls-Royce F type engine.
Moteur Rolls-Royce du type F.
El Motor Rolls-Royce del tipo F.

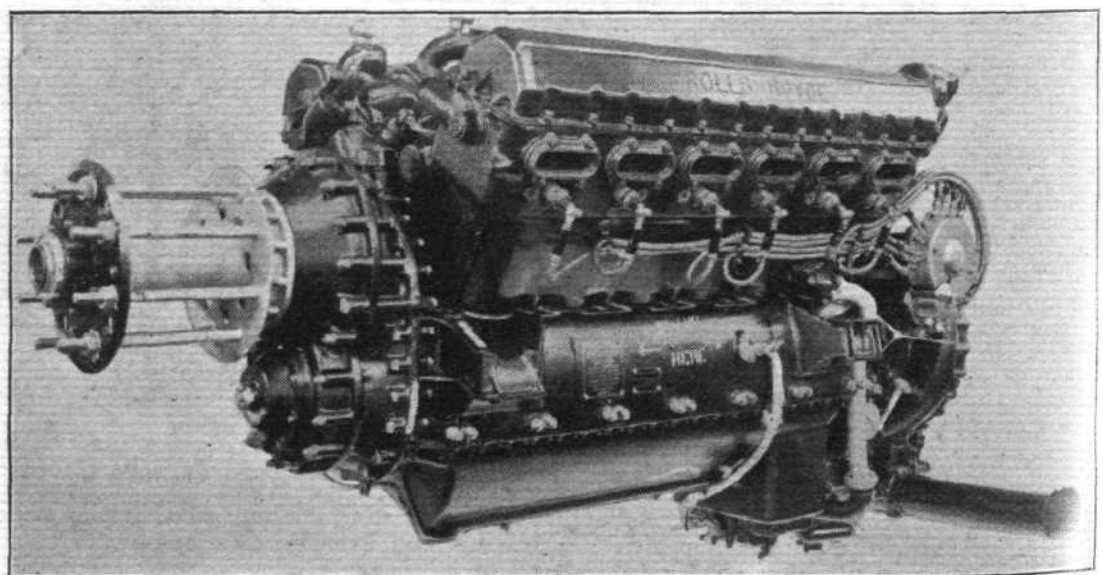


The Rolls-Royce type H.10.
Moteur Rolls-Royce du type H.10.
El Motor Rolls-Royce tipo H.10.

variétés se subdivisent en trois types suivant le rapport de réduction, et pour chaque rapport de réduction on a le choix entre deux taux de compression. Il y a deux types de compresseurs de suralimentation, dont l'un ou l'autre peut être installé : le type dit "modéré," qui permet la suralimentation au niveau de la mer, et le type pour vol aux hautes altitudes, qui permet de maintenir la puissance au sol jusqu'à l'altitude stipulée. Les numéros de série XI, XII et XIV indiquent les différents rapports de démultiplication, et les lettres A ou B désignent respectivement le taux de compression faible ou élevé, tandis que les lettres additionnelles MS ou S indiquent si le moteur est à suralimentation modérée ou à pleine suralimentation. Le moteur H, qui est semblable en général au type F, mais de plus grandes dimensions, comporte un suralimenteur modéré qui peut être utilisé pour faciliter l'envol. Il se fournit aussi avec deux rapports de démultiplication, sous les désignations H XII MS et H XIV MS. Les blocs de cylindres des moteurs F et H sont des moulages en aluminium auxquels des culasses communes sont assujetties par de longs boulons qui servent à fixer tout le bloc au carter. Il y a quatre soupapes par cylindre, les deux rangées étant commandées par un arbre à cames unique actionnant des culbuteurs distincts. Les arbres à cames sont entraînés par l'intermédiaire d'un accouplement à ressort produisant le même effet que celui du Condor, mais de construction différente. Les bielles sont du type fourchu, la bielle fendue portant un coussinet garni de métal blanc qui occupe toute la longueur du maneton. Ce coussinet est revêtu de métal blanc extérieurement et sert de portée à l'autre bielle disposée dans la fourche. Tous les moteurs F et H ont un réducteur à simple engrenage cylindrique. Les moteurs suralimentés portent leur compresseur de suralimentation à l'extrémité arrière du carter où il est très nette-

ment disposé. Les magnétos sont montées transversalement, aussi à l'arrière du moteur. Les carburateurs Duplex Rolls-Royce sont installés entre les blocs de cylindres du moteur non suralimenté, les quatre étranglers étant conjugués ensemble par des engrenages de manière à s'ouvrir simultanément. Les compresseurs de suralimentation sont du type à rotor centrifuge entraîné par des engrenages droits. Sur ces engrenages est intercalé un accouplement spécial à friction qui protège l'appareil en cas de mouvements soudains des étrangleurs.

LOS motores principales que construye actualmente esta casa, que cuenta entre las más emprendedoras de cuantas se dedican a la construcción de motores de aviación en la Gran Bretaña, son el Condor III B y los diversos tipos de las nuevas Series F y H. Todos son del tipo con cilindros dispuestos en V a 60°, pero los motores de las Series F y H son de construcción del todo diferente y se diferencian de sus predecesores principalmente en que los cilindros de cada hilera están fundidos en bloque en vez de ser separados. Los cilindros del Condor tienen cada uno una camisa de agua de palastro de acero soldado. Hay dos válvulas de admisión y dos de escape por cilindro, siendo accionadas las válvulas de cada grupo por un árbol de levas único. Hay tres levas sobre cada culata, de las que la central acciona dos balancines y las exteriores un balancín cada una. El árbol de levas recibe el movimiento de árboles inclinados colocados detrás de los cilindros, con interposición de un acoplamiento de resorte amortiguado por fricción, destinado a resguardar el mecanismo de distribución de las irregularidades causadas por las trepidaciones del cigüeñal. El eje de la hélice es movido por un reductor del tipo de engranajes rectos de contramarcha. Las



The Rolls-Royce type F
Supercharged engine.
Moteur Rolls-Royce du
type F à suralimenteur,
El motor Rolls-Royce del
tipo F, con sobrealimentador.

magnetos están montadas transversalmente en la parte trasera del motor con los ruptores vueltos hacia afuera. El cigüeñal está sostenido en el cárter de dos piezas por siete cojinetes sencillos forrados de metal blanco. Los motores del tipo F se construyen en doce variedades, comportando todas los mismos elementos constitutivos principales. Estas doce variedades están divididas en tres tipos, según la relación de reducción, y para cada relación de reducción puede escogerse una de dos relaciones de compresión. Hay dos tipos de compresor de sobrealimentación, de los que puede instalarse uno u otro, a saber el llamado "moderado," que permite la sobrealimentación al nivel del mar, y el tipo para el vuelo a grandes altitudes que permite mantener la potencia en el suelo hasta la altitud estipulada. Los números de serie XI XII y XIV indican las diferentes relaciones de desmultiplicación y las letras A o B la relación de compresión baja o alta respectivamente. Las letras adicionales MS o S indican si el motor tiene sobrealimentación moderada o plena sobrealimentación. El motor H., que es parecido en general al tipo F, pero de tamaño más grande, tiene un sobrealimentador moderado que puede usarse para facilitar la arrancada. Suminístrase también con dos relaciones de desmultiplicación conociéndose los motores con las designaciones H XII MS y H XIV MS. Los bloques de cilindros de los motores, F. y H., son piezas fundidas de aluminio, a las que las culatas

fundidas comunes están aseguradas por pernos largos, que sujetan todo el bloque al cárter. Hay cuatro válvulas por cilindro, siendo accionadas las dos hileras por un árbol de levas único por medio de balancines separados. Los árboles de levas son movidos por medio de un acoplamiento de resorte de acción parecida a la del acoplamiento análogo del Condor, pero de construcción distinta. Las bielas son del tipo ahorquillado, llevando la biela partida un cojinete forrado de metal blanco, que ocupa todo el largo del muñón. Este cojinete está cubierto exteriormente de metal blanco, que forma un soporte para la otra biela dispuesta en la horquilla. Todos los motores F y H tienen un reductor de engranaje recto sencillo. Los motores con sobrealimentador llevan su compresor en la parte trasera del cárter, donde está nítidamente dispuesto. Las magnetos están montadas transversalmente, también en la parte trasera del motor. Hay dos carburadores Duplex Rolls-Royce montados entre los bloques de cilindros del motor sin sobrealimentador, estando conjugadas las cuatro mariposas de tal suerte que se abren simultáneamente. Los compresores de sobrealimentación son del tipo de rotor centrífugo accionados por engranajes rectos. En estos engranajes hay un acoplamiento especial de fricción que resguarda el aparato en caso de movimientos repentinos de las mariposas.

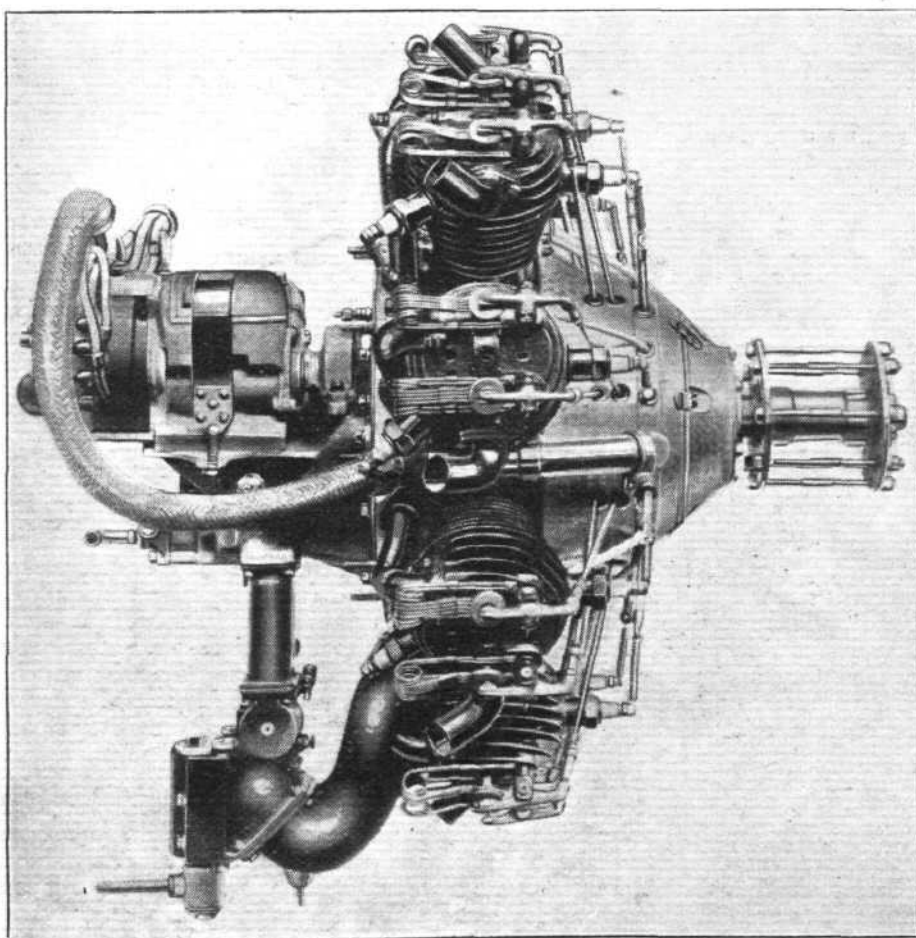


SALMSON

BRITISH SALMSON AERO ENGINES, LTD.,

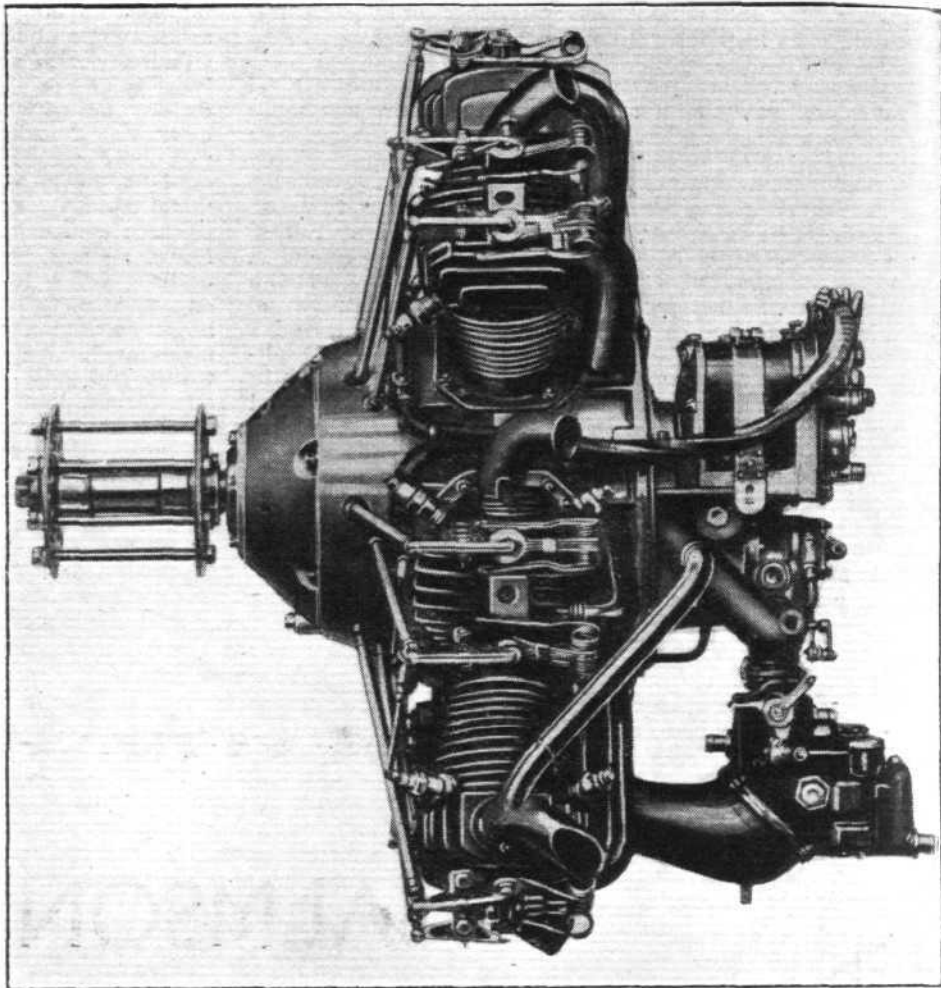
NEW MALDEN, SURREY

AS pioneers in the design of radial aero engines the Salmson Co. do not need any introduction to our Continental readers. As the engines are now being manufactured in Great Britain they may now be classed among British aero engines, three very successful productions of the parent firm being available. These are the 50-h.p. type AD 9, the 105-h.p. seven-cylinder AC 7, and the 135 h.p. AC 9. The first is a tiny nine-cylinder engine, having a bore of 70 mm. only, whilst the other two engines have interchangeable cylinders of 100 mm. bore, one having seven and the other nine cylinders; the two latter engines are similar, excepting the number of cylinders. One of the many outstanding performances of the 50-h.p. engine is a flight of over 26 hours by Mme. Bastie. All these engines provide a direct drive for the airscrew shaft. All the auxiliary drives are located at the rear of the crankcase which is of the split type. The cylinders are of composite construction, comprising a closed-ended steel barrel, over which is cast a deeply-finned aluminium head, in which two valves are fitted. The valve springs are of the characteristic Salmson horizontal coil or hairpin type. The induction manifold is exhaust heated. The two magnetos are mounted side by side at the rear of the engine with their distributors facing rearwards.

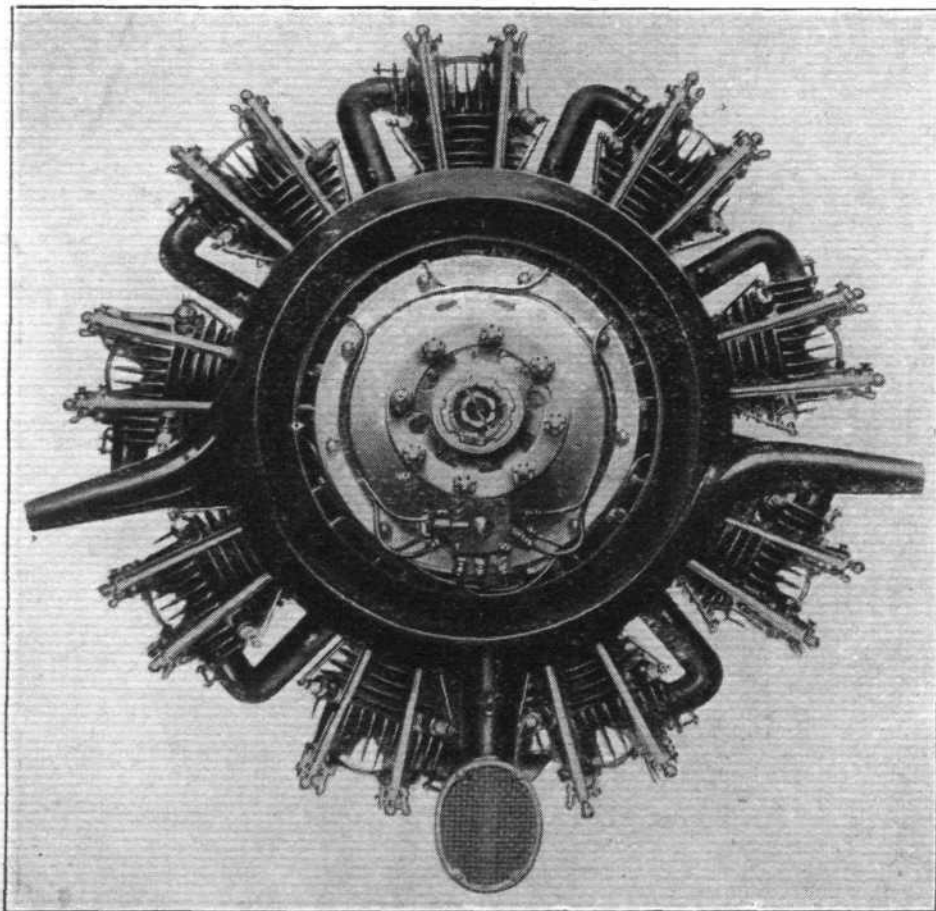


Salmson A.D.9.

PIONNIÈRE de la construction de moteurs d'aviation en étoile, la compagnie Salmson n'a pas besoin d'introduction auprès de nos lecteurs continentaux, mais comme les moteurs Salmson se construisent aujourd'hui en Grande Bretagne, il est permis de les classer au nombre des moteurs de production britannique. Il existe trois éditions du produit de la maison mère qui ont un grand succès, ce sont : le 50 h.p. type AD 9, le 105 h.p. sept cylindres AC 7, et le 135 h.p. AC 9. Le premier est un minuscule moteur à neuf cylindres n'ayant que 70 mm. d'alésage, tandis que les deux autres ont des cylindres interchangeables de 100 mm. d'alésage, au nombre de sept dans l'un et de neuf dans l'autre. Ces deux derniers moteurs sont semblables, sauf en ce qui concerne le nombre de cylindres. Une des nombreuses et magnifiques performances du moteur 50 h.p. est un vol de durée de plus de vingt-six heures par Mme. Bastié. Tous ces moteurs ont un arbre d'hélice à prise directe. Toutes les commandes auxiliaires sont disposées à l'arrière du carter, qui est du type divisé. Les cylindres sont de construction composée comportant un fût fermé en acier sur lequel est venu de fonderie une culasse en aluminium munie de larges ailettes et portant deux soupapes. Les ressorts des soupapes sont du type caractéristique Salmson à boucle horizontale ou en "épingle à cheveux." Le collecteur d'admission est réchauffé par l'échappement. Les deux magnétos sont montées côte à côte à l'arrière du moteur avec leurs distributeurs tournés vers l'arrière.



Salmson A.C.7.



Salmson A.C.9

COMO casa que ha ido siempre a la vanguardia en todo lo que atañe a la construcción de motores de aviación en estrella, la Compañía Salmson no necesita ser presentada a nuestros lectores del continente europeo, pero como los motores Salmson se están construyendo ahora en la Gran Bretaña, pueden contarse entre los motores de fabricación británica. Hay tres modelos entre los que produce la casa matriz que han tenido gran éxito y que son : el tipo AD9 de 50 c. de f., el tipo AC7 de siete cilindros y 105 c. de f., y el tipo AC9 de 135 c. de f. El primero es un motor que no tiene más que 70 mm. de diámetro interior, mientras que los otros dos motores tienen cilindros intercambiables de 100 mm. de diámetro interior. Los dos últimos motores son idénticos, salvo que uno tiene siete cilindros y el otro nueve. Uno de los muchos vuelos magníficos realizados por aviones impulsados por el motor de 50 c. de f. es uno de más de 26 horas de duración hecho por Mme. Bastié. Todos estos motores tienen una hélice de toma directa. Todos los mandos auxiliares están situados en la parte trasera del cárter, que es del tipo dividido. Los cilindros son de construcción compuesta y constan de un cuerpo cerrado de acero sobre el cual está fundida una culata de aluminio provista de aletas anchas, en la que hay dos válvulas. Los resortes de las válvulas son del tipo característico Salmson, de espiras horizontales o de "horquilla." El colector de admisión va calentado por el escape. Las dos magnétos están montadas lado a lado en la parte trasera del motor, con sus distribuidores vueltos hacia atrás.

[illegible]

R = Radial = En étoile = En estrella. L = In line = En ligne = En linea. V = 60° = Décalés de 60° en "V" = Decalados a 60° en V.
I = Inverted = Inverse = Invertido. W = Broad arrow = En éventail = En abanico. H = H arrangement = Disposition en "H" = Disposicion
en H. H.O. = Horizontal opposed = Opposés horizontalement = Horizontalmente opuestos. A = Air cooled = A refroidissement par air = D = Direct drive = A prise directe
Con entraînement port airt. W = Water cooled = A refroidissement par eau = Con enfriamiento por agua. BE = Bevel epicyclic gear = Engre-
naine directe. S = Straight spur gear = Engrenage à denture cylindrique droite = Engrenaje cilíndrico recto. BE = Bevel epicyclic gear = Engre-
naje à denture épicycloïde conique = Engrenaje de satélites cónicos. SE = Spur epicyclic gear = Engrenage à denture épicycloïde droite = Engrenaje de
satélites rectos. H = Helical spur gear = Engrenage à denture hélicoïdale = Engrenaje recto con dentadura helicoidal. C.S. = Counter-shaft =
arbre de renvoi = Árbol de contramarcha.

AERODROME EQUIPMENT

AÉRODROMES, EQUIPEMENT POUR

■ Cette maison s'occupe de l'étude, de la fabrication et du montage de tous genres de charpentes en acier pour le bâtiment, ainsi que de hangars à ossature en acier.

Elle est en mesure d'entreprendre les opérations de montage en n'importe quelle partie du monde, et, comme elle possède également un chantier de bois de construction, elle peut donc établir tous devis pour bâtiments mixtes, y compris même les cloisons en bois nécessaires pour les bureaux.

Elle construit aussi tous genres de clôtures et de portes en fer et en acier, de même qu'un matériel breveté de palissade marque "Lochrin," lequel constitue un genre de clôture parfaitement approprié pour l'entourage des fabriques et des aérodromes.

Société dont les pompes à essence et les installations en tous genres pour le ravitaillement en combustible ont déjà servi à équiper de nombreux aérodromes. L'une des constructions les plus intéressantes de cette maison, est constituée par une fosse spéciale permettant le ravitaillement du combustible à fleur de terre. Grâce à cet agencement, on a la faculté d'installer sous terre un compteur de combustible d'une lecture précise, ainsi qu'une longueur considérable de tuyau flexible, en un point choisi de l'aérodrome, où peut s'effectuer le plein d'essence à bonne distance de tous obstacles. La maison se charge d'ailleurs de fournir et d'installer tous types de pompes absolument modernes, à tête pivotante ou à colonne montante, susceptibles de s'actionner soit à la force motrice, soit par un mécanisme à bras.

WILLIAM BAIN & CO., LTD.,

Coatbridge, Scotland.

THIS firm designs, manufactures and erects all types of Constructional Steelwork, and Steel Framed Hangars.

They are in a position to undertake erection in any part of the world, and have a Timber Department, thus being in a position to quote for composite Buildings, including the necessary interior partitions in wood for Offices.

They also manufacture all types of Iron and Steel Fencing and Gates, including their patent "Lochrin" Palisading, which is a Fence most suitable for surrounding Factories and Aerodromes.

S. F. BOWSER & CO., INC.,

Victoria Street, London, S.W. 1.

PETROL pumps and fuelling installations of all types are provided by this firm, and have been installed on many aerodromes. One of the most interesting of their productions is the flush type of fuelling pit. This enables an accurate reading fuel meter and a considerable length of hose to be kept under ground at a point somewhere out on the aerodrome, where it is available for use for refuelling clear of all obstructions. All modern types of pumps, including the Swinging Head and Stand types, are provided and installed, and these may be provided with either a power drive or hand mechanism.

AERÓDROMOS, EQUIPOS PARA

Esta firma se dedica al estudio, la fabricación y el montaje de todas clases de obras de construcción de acero, así como también de hangares de estructura de acero.

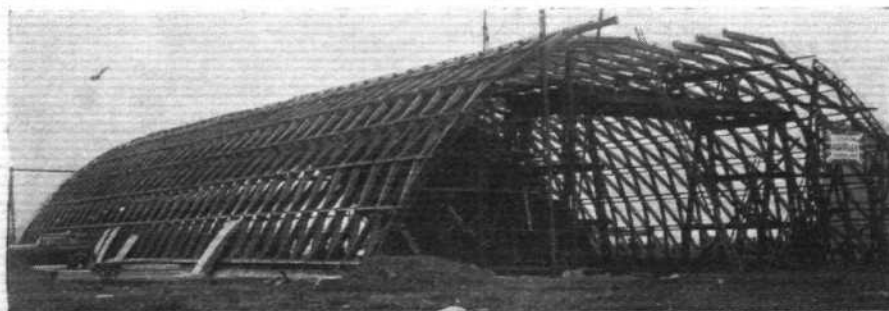
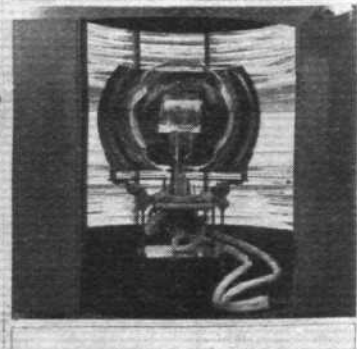
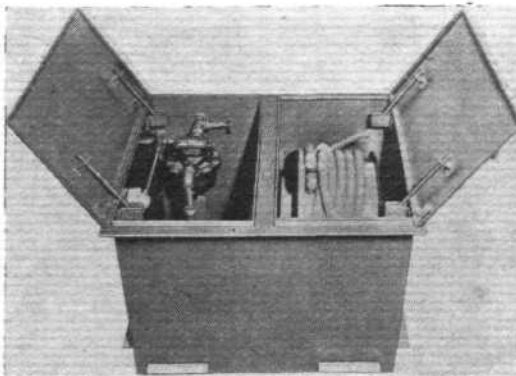
Dicha firma se halla en situación excelente de encargarse de las operaciones de montaje en cualquier parte del mundo y, como cuenta con un departamento de madera de construcción, puede también encargarse de someter presupuestos para edificios mixtos incluyendo los tabiques necesarios de madera para las oficinas.

Esta casa se encarga igualmente de la construcción de enrejados y verjas de hierro y acero, así como también de un material patentado de empalizadas marca "Lochrin," el cual constituye una clase de enrejado muy apropiada para los fines de cercar las fábricas y los aeródromos.

Esta es una sociedad cuyas bombas de gasolina e instalaciones de todas clases para el revituallamiento de combustible ya han sido montadas en numerosos aeródromos. Una de las construcciones más interesantes de esta casa, queda constituida por un foso especial que permite el revituallamiento de combustible a flor de tierra. Gracias a este arreglo, se dispone la facultad de instalar bajo tierra un contador de combustible de una indicación exacta, así como también de una longitud considerable de tubería flexible, en un punto escogido del aeródromo, donde se pueda efectuar el reaprovisionamiento de gasolina a una buena distancia de todos los obstáculos. La casa se encarga igualmente de suministrar y de instalar todos los tipos de bombas absolutamente modernos, de cabeza oscilante o de columna vertical, los cuales pueden ser accionados ya sea por fuerza motriz o por medio de un mecanismo a mano.

Droite : Compteur et tuyau de plein d'essence type Bowser à fleur de terre, et lampe de projecteur Chance. Bas : Hangar Horseley Lamella en construction.

Derecha : Contador y tubería de gasolina tipo Bowser a flor de tierra y lámpara de proyector Chance. Abajo : Hangar Horseley Lamella en construcción.



Above : A Bowser flush-type fuel supply hose and meter and the lamp of a Chance floodlight.
Below : A Horseley "Lamella" hangar in construction.

La Cellactite constitue un matériel spécial pour toitures, fabriqué à l'aide d'un composé minéral et comportant une âme intérieure en acier. Cette âme intérieure, qu'un bitume chimiquement inerte met positivement à l'abri de toute oxydation, est protégée des deux côtés au moyen d'un revêtement en feutre d'asphalte-amiante parfaitement homogène. La Cellactite offre de nombreux avantages pour l'exécution des travaux de couverture, car, échappant à toute oxydation, elle n'exige point de peinture. Elle est donc d'un emploi tout indiqué pour couvrir les hangars, quelle que soit la nature du climat, étant capable de résister indéfiniment aux effets du soleil le plus ardent, tout comme à ceux du froid le plus intense.

Cette société s'est acquis près d'un siècle d'expérience dans la construction d'appareils d'éclairage de toutes sortes.

Ses fabrications comprennent : Phares d'aviation pouvant servir soit au balisage des lignes aériennes, soit de feux de terrain pour aérodromes. Puissants projecteurs permettant d'atterrir à l'endroit propice en toute sécurité—un seul de ces appareils de type normal étant capable d'assurer la distribution uniforme, sur toute la superficie du terrain d'atterrissage, d'un éclairage en nappe dont la puissance égale près d'un million de bougies. Indicateurs de vent éclairés et automatiques, servant à renseigner les aviateurs quant à la direction et à la force du vent, et dont la manœuvre effectuée dans les bâtiments mêmes de l'aérodrome, permet de signaler au pilote la meilleure direction pour atterrir par vent nul. Feux de délimitation de terrain, pouvant se rabattre sur le côté afin d'éviter ainsi tout danger pour les appareils qui les survolent. Feux servant à marquer tous obstacles permanents ou temporaires, et, enfin, projecteurs pour déterminer la hauteur des nuages.

Les portes pliantes et coulissantes "Esavain," désormais très connues et d'un emploi général pour les hangars d'aviation, se construisent d'après le principe du vantail pliant. Chaque vantail a 90 cm. de large, et peut se construire de différentes hauteurs jusqu'à concurrence d'environ 7 m. 60. Ces portes sont munies d'un mécanisme d'ouverture et de fermeture permettant à un seul homme d'en effectuer la manœuvre sans aucune difficulté, par n'importe quel temps. On peut ajouter que l'une de ces portes, ayant plus de 30 mètres de longueur, a été installée au vaste hangar de l'aérodrome de Heston.

La maison En-Tout-Cas, renommée dans le monde entier pour l'aménagement des courts de tennis et des bowling greens, se consacre depuis un certain temps déjà à la construction des aérodromes et des hangars. Elle revendique tout particulièrement que sur les aérodromes aménagés par ses soins, l'écoulement des eaux s'effectuera avec la même perfection que sur un bowling green, et

CELLACTITE & BRITISH URALITE, LTD.

Higham, Kent.

CELLACTITE is a roofing material manufactured from a mineral compound and furnished with a steel core. This core is permanently sealed from all corrosive influences by chemically inert bitumen and thickly coated on both sides with a proofing of homogeneous "asphalt asbestos" felt. Its advantages as a roofing material are many, as it needs no paint, for it cannot corrode; it is therefore perfectly suitable for hangar roofs in any climate, and will resist tropical sun or arctic cold indefinitely.

CHANCE BROTHERS & CO, LTD.,

Smethwick, Birmingham.

THIS Company has nearly 100 years' experience in the construction of all forms of lighting apparatus.

Their productions include Aerial Lighthouses for air route lighting or as Location Beacons for aerodromes, Floodlights for illuminating the safe landing area, one normal unit giving an even light distribution of nearly one million candle-power over the surface of the actual landing ground. Automatic Illuminated Wind Indicators, showing a pilot the direction and strength of the wind and under control from the aerodrome buildings so that the best landing direction may be ordered when there is no wind. Boundary Lights which are collapsible, avoiding danger to aircraft passing over them. Obstruction Lights for permanent and temporary obstacles, and Ceiling Lights for determining the height of the clouds.

EDUCATIONAL SUPPLY ASSOC., LTD.,

Esavain House, 171, High Holborn, W.C. 1

ESAVIAN folding and sliding doors have now become well known and are in general use for aeroplane hangars.

These doors are built up on the folding leaf principle, the leaves being 3 ft. wide and of various heights up to about 25 ft. The doors are fitted with winding gear so that one man may operate them easily in any weather without difficulty. Such a door, which is over 100 ft. in length, has recently been erected in the large hangar at Heston aerodrome.

THE EN-TOUT-CAS CO., LTD.,

Syston, near Leicester.

EN-TOUT-CAS, one of the best-known firms in the world for the construction of tennis courts and bowling greens, have now turned their attention to the construction of aerodromes and hangars. Their contention is that an aerodrome prepared by them drains like a bowling green and is as

La Cellactite constituye un material especial para techados, fabricado de una composición mineral y dotado de un núcleo de acero. Este núcleo que se pone positivamente al amparo de toda oxidación por medio de un betún químicamente inerte, queda protegido en sus dos costados por medio de un revestimiento de fieltro de asfalto amianto perfectamente homogéneo. La Cellactite ofrece numerosas ventajas para la ejecución de trabajos de recubrimiento de techos puesto que, quedando inmune a toda oxidación, no exige pintado alguno. Por lo tanto, su empleo se presta singularmente para los trabajos de recubrir los hangares, sea cual fuere la naturaleza del clima, y es capaz de resistir indefinidamente los efectos del sol más ardiente, así como también los del frío más intenso.

Esta compañía tiene adquirida cerca de un siglo de experiencia en la construcción de todas clases de aparatos de alumbrado.

Sus producciones comprenden : Faros de aviación que sirven para la iluminación de las líneas aéreas o como focos de indicación para aeródromos. Potentes proyectores que permiten el aterrizaje en el punto propicio con toda seguridad—uno solo de estos aparatos de tipo normal es capaz de proporcionar la distribución uniforme, sobre toda la superficie del terreno de aterrizaje, de una iluminación de una potencia de cerca de un millón de bujías. Indicadores de viento, luminosos y automáticos, que se destinan a indicar a los pilotos la dirección y la fuerza del viento, y cuya maniobra efectuada en los locales mismos del aeródromo permite que se indique al piloto la mejor dirección para aterrizar cuando no haya viento. Luces limítrofes, del tipo que puede plegarse sobre el costado a fin de evitar todo peligro para los aviones que vuelan sobre ellas. Luces que se destinan a indicar todos los obstáculos permanentes o temporarios y, en fin, proyectores especiales para determinar la altura de las nubes.

Las puertas plegadizas y corredizas marca "Esavain," han llegado a ser muy conocidas y de un empleo general para los hangares de aviación, y se fabrican de acuerdo con el principio de hoja plegable. Cada hoja tiene una anchura de 90 cm., y se puede fabricar de alturas diferentes hasta unos 7,60 metros. Estas puertas están provistas de un mecanismo de abertura y de cierre que permite que un solo hombre pueda efectuar esta maniobra sin dificultad alguna, sea cual fuere el estado del tiempo. No estaría por demás añadir que una de estas puertas, de más de 30 metros de largo, ha sido instalada en el gran hangar del aeródromo de Heston, Inglaterra.

La casa En-Tout-Cas, renombrada en todas partes del mundo entero en cuanto a la preparación y construcción de canchas para tenis y bochas, se ha dedicado desde hace ya algún tiempo a la construcción de aeródromos y de hangares. Esta firma reivindica muy especialmente que en los aeródromos preparados por sus propios medios el desagüe de las aguas se efectuará con la

que la surface du terrain présentera la même fermeté et la même excellence de nivellement que celle d'un court de tennis. Les hangars de construction mixte mis au point par cette maison comportent tous les derniers perfectionnements, et, parmi les travaux les plus récents ainsi exécutés, on peut citer le hangar monté à Ratcliffe, sur l'aérodrome particulier de Mr. Lindsey Everard, Membre du Parlement de la circonscription de Melton, Leicester.

Appareils en tous genres pour la manutention, l'entretien et la réparation des moteurs, matériel si indispensable aux ateliers de l'aérodrome moderne, telles sont les spécialités que se charge de fournir cette maison. On doit citer notamment ses outillages à commande électrique servant à rectifier les cylindres et à refaire les portées de soupape, ses installations de décarassage, ses perceuses électriques portatives, ses lève-soupapes, grues, vérins et palans, ainsi que tous autres appareillages mécaniques permettant d'économiser la main-d'œuvre et dont on a tant besoin pour ce genre de travaux. La maison construit également des installations de lavage à haute pression, de même qu'un chevalet pivotant breveté qui simplifie énormément le travail à exécuter sur tous moteurs d'un poids considérable.

Maison s'occupant de la construction en Angleterre d'un genre de hangars vraiment unique, d'après les brevets appartenant à la compagnie allemande Junker. Il s'agit d'une construction spéciale reposant sur l'emploi de poutrelles cloisonnées ou en treillis, à segments multiples, et qui se prête admirablement à un montage aussi rapide que peu coûteux.

Il s'agit ici de l'une des rares maisons qui, en Angleterre, s'est fait une spécialité de la préparation des terrains d'aérodrome. Les méthodes employées par Mr. Hunter apportent d'ailleurs une véritable révolution dans l'exécution des travaux de cette nature, car, dans la plupart des cas, il se charge lui-même d'établir l'outillage à employer pour le nivellement et l'aménagement du terrain. Mettant également à profit ses connaissances spéciales de marchand grainetier, Mr. Hunter est arrivé à mettre au point des mélanges de gazon appropriés, dont l'emploi assure sur les aérodromes l'établissement d'une surface vraiment durable, quelles que soient les conditions. Le nombre des aérodromes anglais aménagés par Mr. Hunter est déjà considérable, et ils sont tous renommés pour l'excellence de leur surface, dont l'aspect rappelle pour ainsi dire celui d'un billard. L'écoulement des eaux constitue un autre problème important, souvent perdu de vue pour l'aménagement des champs d'aviation. A cet égard encore, Mr. Hunter est en mesure de tirer le plus grand parti de sa grande expérience, et de rendre possible l'utilisation de terrains antérieurement considérés comme impraticables.

firm and as level as a tennis court. Their hangars, of composite construction, are designed with all the latest improvements, and amongst the more recent of these may be mentioned one which they erected at Ratcliffe, the private aerodrome of Mr. Lindsey Everard, the M.P. for the Melton Division of Leicester.

HARVEY FROST & CO., LTD.,

148, Great Portland St., London, W. 1.
SERVICING appliances of all types for handling and reconditioning engines such as are required in the workshops at any modern aerodrome are the goods supplied by this firm. These include electrically-operated cylinder grinders and valve refacers, decarbonising outfits, portable electric drills, valve lifters, cranes, jacks and purchases, and all other mechanical labour-saving plant which is required in such work. They also manufacture high-pressure washing plants and a patented swinging engine stand, which greatly simplifies work on heavy engines.

HORSELEY BRIDGE CO., LTD.,

Birmingham.
A UNIQUE form of hangar construction is that which this Company uses over here under patents from the Junkers Co., of Germany. This may best be described as segmental lattice girder construction, and it lends itself admirably to rapid and cheap construction.

JAMES HUNTER, LTD.,

Chester.
JAMES HUNTER is one of the few firms in this country which has specialised in preparing ground for use as aerodromes. Mr. Hunter's methods are revolutionary in that, in most cases, he designs his own tools for levelling and grading. He also has wide experience as a seed merchant, and as such has been able to evolve suitable grass mixtures which provide a durable aerodrome surface under all conditions. The number of aerodromes in this country prepared by Mr. Hunter is already considerable, and they are well known for their billiards table-like appearance. A further point which is often overlooked when preparing an aerodrome is the drainage, and it is here also that Mr. Hunter has been able to apply his specialised knowledge and make useful many sites which have previously been considered impracticable.

misma perfección que en una cancha de bochas, y que la superficie del terreno presentará la misma firmeza y la misma excelencia en cuanto a nivelación como la de una cancha de tennis. Los hangares de construcción mixta hechos por esta casa incorporan todos los últimos perfeccionamientos y, entre los trabajos más recientes que han sido ejecutados se puede hacer mención del hangar montado en Ratcliffe, en el aeródromo particular de Mr. Lindsey Everard, Miembro de Parlamento de la circunscripción de Melton, Leicester, Inglaterra.

Aparatos de todos los tipos para la manutención, el entretenimiento y el reacondicionamiento de los motores, material tan indispensable para los talleres de todo aeródromo moderno, tales son las especialidades que esta casa se encarga de suministrar. Se hace mención especial de sus aparatos de mando eléctrico que se destinan a rectificar los cilindros y a esmerilar de nuevo las caras de las válvulas, sus equipos de decarbonización, sus taladradoras eléctricas portátiles, sus alza-válvulas, grúas, gatos y aparejos, así como también de sus otras instalaciones mecánicas que contribuyen a economizar la mano de obra y que son de tanta necesidad para esta clase de trabajo. La casa construye igualmente instalaciones de lavar a alta presión y un caballete pivotante patentado que simplifica enormemente el trabajo que se tiene que llevar a cabo sobre los motores de peso considerable.

Esta casa se ocupa de la construcción en Inglaterra de hangares de un tipo verdaderamente sin igual, de acuerdo con las patentes que pertenecen a la compañía alemana Junker. Este tipo puede describirse mejor como una construcción especial efectuada por medio del empleo de vigas entrelazadas o de celosía, de segmentos múltiples, que se presta singularmente a un montaje rápido a la par que poco costoso.

Esta es una de las muy pocas casas que, en Inglaterra, se ha especializado en la preparación de terrenos para aeródromos. Los métodos adoptados por Mr. Hunter constituyen en realidad una verdadera revolución en la ejecución de los trabajos de esta naturaleza pues, en la mayoría de los casos, él mismo se encarga de concebir sus propias herramientas que deben emplearse para la nivelación y la preparación del terreno. Poniendo igualmente a beneficio sus conocimientos especiales en calidad de comerciante de semillas, Mr. Hunter ha podido desarrollar las mezclas de hierba apropiadas cuyo empleo asegura para los aeródromos el establecimiento de una superficie verdaderamente duradera, sean cuales fueren las condiciones. El número de aeródromos ingleses preparados por Mr. Hunter ya es considerable, los cuales son muy renombrados por la excelencia de su superficie cuya apariencia se asemeja a la de una mesa de billar. El drenaje de las aguas constituye otro problema importante que muy a menudo se pierde de vista en la preparación de los campos de aviación, y este es un punto en el cual Mr. Hunter ha podido sacar el mayor provecho de su vasta experiencia especializada, con el objeto de hacer posible la utilización de terrenos que anteriormente se consideraban impracticables.

Maison spécialiste de la construction d'appareils d'éclairage pour aérodromes. Parmi ses fabrications, on peut citer: Projecteurs d'atterrissage, fixes et transportables; feux de délimitation pour aérodromes; projecteurs pour déterminer la hauteur des nuages; phares au néon, ainsi que différents genres de feux d'obstacles destinés non seulement aux lignes aériennes, mais encore à signaler toutes obstructions se trouvant dans le voisinage des aérodromes; et, enfin, tous genres de feux de signalisation. Ces appareils d'éclairage fonctionnent soit à l'électricité, soit à l'acétylène, selon le lieu d'utilisation.

Cette société se consacre à la construction de hangars en tôle, et de tous bâtiments de vastes dimensions dont les baies doivent nécessairement présenter une grande envergure.

THE LONDON ELECTRIC FIRM, South Croydon, Surrey.

AERODROME illumination equipment is the speciality of The London Electric Firm. This includes floodlights, both of the portable and fixed type, also boundary lights for marking the confines of the aerodrome, ceiling projectors for ascertaining the height of the clouds, Neon beacons and other forms of mark and obstruction lights, not only for marking air routes, but also for marking obstructions near the aerodrome, and all types of signalling lamps. Electricity and acetylene are both used for the illuminant according to the location of the apparatus.

RIPON STEEL CO., LTD., Ripon.

HANGARS and all large buildings requiring large clear spans are erected by this Company who use iron sheet for the purpose.

Los equipos de aparatos de alumbrado para aeródromos constituyen la especialidad de esta casa. Entre sus diversas fabricaciones se pueden citar los faros de aterrizaje, del tipo fijo y portátil, luces limitrofes que se destinan a marcar los límites de los aeródromos, proyectores especiales para determinar la altura de las nubes, fanales de neon, así como también otras formas distintas de luces de indicación que se destinan no solamente para marcar las líneas aéreas sino que también para marcar todos los obstáculos que puedan hallarse en la vecindad de los aeródromos y, en fin, todas clases de lámparas de señales. Estos aparatos de alumbrado funcionan ya sea por medio de la electricidad o por acetileno, de acuerdo con el lugar de utilización de los aparatos.

Esta sociedad se dedica a la construcción de hangares de chapas, así como también de todas clases de edificios de grandes dimensiones en los cuales las secciones tienen necesariamente que presentar una gran envergadura.

AIRCRAFT COMPONENTS

PIÈCES DETACHÉES POUR AVIONS

Bien qu'il soit très connu à l'étranger, le système de commande Arens n'est pas encore d'un usage bien répandu en Angleterre. Ces temps derniers, toutefois, certains appareils munis de ce système ont exécuté quelques vols importants, de sorte qu'il est en train de se vulgariser rapidement chez nous. Ce système est constitué par une enveloppe rigide dont l'intérieur livre passage à un câble autour duquel est enroulé un ressort complètement bandé. A chacune de ses extrémités le câble se termine par un tube plus petit, capable de glisser à l'intérieur de l'enveloppe, de sorte que l'on a la faculté de pousser ou de tirer le câble dans l'enveloppe extérieure, la tension s'exerçant sur le câble et la compression sur le ressort. Il est permis d'affirmer que les commandes pour avions ne comportent pour ainsi dire pas une seule utilisation à laquelle ce système ne serait pas susceptible de se prêter.

Les hélices en bois fabriquées par cette société s'utilisent sur les avions anglais depuis les premiers débuts de l'industrie dans notre pays, et il n'existe probablement pas d'autre maison dont les ateliers de dessin aient pu accumuler une plus grande somme de connaissances spécialisées au sujet de cet organe si important. Ainsi qu'il va sans dire la société a reçu l'approbation du Ministère de l'Air de Grande Bretagne pour la construction et la fabrication des hélices en bois de tous modèles, et ses produits s'utilisent dans la plupart des pays du monde. Dans notre pays, les hélices en bois se construisent à l'aide d'acajou provenant du Honduras, essence dont la maison possède un stock très important, de qualité supérieure, pour les besoins de son industrie.

ARENS CONTROL LTD., 14, Regent St., London, S.W.1.

ARENS control, while well known abroad, has not hitherto greatly been used in this country. Recently, however, machines fitted with this form of control have made outstanding flights, with the result that it is rapidly becoming well known. The control is a rigid casing through which runs a cable, round which is wound a fully compressed spring. The cable finishes at each end in a smaller tube which can slide inside the casing, thus the cable can be both pushed and pulled through the casing, the cable taking the tension and the spring the compression. There is almost no use in aircraft controls to which it cannot be put.

THE AIRSCREW CO., Weybridge, Surrey.

WOODEN airscrews manufactured by this Company have been fitted to British aircraft since the earliest days, and probably there is no one firm whose Design Department has accumulated such a large amount of specialised knowledge of this important factor. The Company is, of course, approved by the British Air Ministry for the design and manufacture of every type of wooden airscrew, and these are used in most countries of the world. Wooden airscrews in this country are constructed of Honduras mahogany, and the Company holds a large stock of the finest quality for this purpose.

Aunque el mecanismo de control "Arens" es bien conocido en otros países, no se ha usado hasta ahora mayormente en la Gran Bretaña. Sin embargo, recientemente se han efectuado vuelos prominentes con máquinas provistas de esta forma de control, con el resultado de que su empleo se va extendiendo más cada día. Este sistema consiste de una envoltura rígida a través de la cual pasa un cable, y alrededor de éste se enrolla un resorte totalmente comprimido. El cable termina a cada lado en un tubo más pequeño que puede deslizarse dentro de la envoltura, pudiendo, por lo tanto, hacer empujar el cable y tirar de él a través de ésta; la tensión se ejerce sobre el cable y la compresión sobre el resorte. Puede afirmarse que apenas existe en la aviación algún mecanismo de gobierno al cual no pueda aplicarse este sistema.

Las hélices hechas de madera por esta compañía han sido incorporadas en los aparatos de aviación británicos desde los días más tempranos de la aeronáutica, y quizás no existe una sola casa cuya Sección de Diseños haya acumulado un conocimiento especializado tan vasto en respecto de este factor tan importante. Como es natural, las producciones de la compañía han sido aprobadas por el Ministerio Británico de Aviación, en cuanto al diseño y la manufactura de todos tipos de hélices de madera, las cuales se emplean en casi todos los países del mundo. En Inglaterra las hélices de madera se fabrican de caoba de Honduras, para cuyo efecto la compañía dispone de una importante existencia de la mejor calidad de este material.

Les pare-brise Auster en glace ordinaire ou en glace Triplex sont trop connus pour nécessiter une description détaillée. Ils comportent tous modèles appropriés aux exigences des appareils d'aviation de tous types, du plus petit au plus grand.

Il y a longtemps que Bakelite fabrique des bases et des cadrans moulés pour interrupteurs, commutateurs et instruments en tous genres. Une de ses dernières créations est la Bakélite en feuilles, nouvelle doublure intérieure pour habitacles et cabines d'avions. Cette matière est exceptionnellement résistante et ne pèse que la moitié du poids de l'aluminium; elle ne se laisse ni cintrer, ni rétrécir, ni gonfler, ni gauchir par les influences atmosphériques, et peut se fournir avec surface polie façon acajou, noyer ou chêne, ou encore polie noire.

Spécialité d'accessoires divers et de petites pièces détachées pour avions, telles que: boulons, écrous, rondelles, tendeurs et chapes, aussi bien en acier qu'en duralumin. Les pièces en acier reçoivent un placage au cadmium ou au zinc pour éviter tout danger de corrosion, à moins qu'elles ne soient déjà en acier inoxydable. Quant aux pièces en duralumin, de même que les robinets à essence, clapets, raccords de tuyauterie, éclisses, cosses doubles de ce même métal, elles sont soumises à un traitement anodique destiné à obtenir un résultat analogue.

AUUSTER, LTD., Barford St., Birmingham.

AUSTER wind screens in both plain and Triplex glass are too well known to need description. Suitable designs are available for every type of aircraft from the smallest to the largest.

BAKELITE, LTD.,

68, Victoria Street, London, S.W. 1.

BAKELITE have long manufactured moulded bases and faces for switches and instruments of all kinds. One of the latest of their productions is Bakelite Laminated, which provides a new material for lining aircraft cabins. It is exceptionally strong, and is only half the weight of aluminium; climate will not cause it to bend, shrink, swell or warp, and it can be supplied with a polished surface resembling mahogany, walnut or oak, or a polished black.

BROWN BROS., LTD.,

Gt. Eastern Street, London,

ARE specialists in aircraft fittings and small parts, such as nuts, bolts, washers, turn-buckles, and fork ends, made both in steel and duralumin, those in steel being cadmium or zinc-coated, or in stainless steel to prevent corrosion. Those in duralumin, and also petrol cocks, valves, pipe couplings, bonding clamps, cleats, etc., in this metal, are anodically treated for the same purpose.

Los para-brisas "Auster" hechos de vidrio común y de cristal Triplex son demasiado bien conocidos para que sea necesario hacer una descripción de ellos. Se disponen de diseños apropiados para todos los tipos de aviones, desde el más pequeño hasta el más grande.

La casa Bakelite fabrica desde hace mucho tiempo bases y superficies para conmutadores e instrumentos de todas clases. Una de sus últimas manufacturas es el "Bakelite" laminado, el cual provee un material nuevo para el revestimiento de cabinas de aeroplanos. Es sumamente fuerte y no pesa más que la mitad del aluminio. Cualquiera que sea el clima, no se curva, encoge o tuerce, y puede suministrarse con una superficie pulimentada semejante a la caoba, el nogal o el roble, o con un pulimento negro.

Esta casa se especializa en la fabricación de herrajes y otras piezas componentes pequeñas para los aparatos de aviación, tales como tuercas, pernos, arandelas, torniquetes y extremos de horquilla, tanto en acero como en duraluminio. Las piezas hechas de acero son sometidas a un procedimiento especial para ser recubiertas de cadmio o de zinc, o bien, se hacen de acero inoxidable como medida de prevención contra la oxidación. Las piezas hechas de duraluminio, así como también las llaves de gasolina, válvulas, uniones para caños, abrazaderas de sujeción, galápagos, etc., hechos de este metal son tratados anódicamente para el mismo fin.



Above: An airscrew by Metal Propellers, Ltd., and a view of the Aircscrew Co.'s works. Below: Fairey Reid airscrews and a Fairey high-speed gun mounting.

Haut: Hélice par Metal Propellers, Ltd., et vue des Usines Aircscrew Co. Bas: Hélices Fairey-Reed et support Fairey pour mitrailleuse tir rapide.

Arriba: Hélice por Metal Propellers, Ltd., y vista de las Fábricas Aircscrew Co. Abajo: Hélices Fairey-Reed y montura Fairey de ametralladora tiro rápido.

Cette société a été la première en Angleterre à se consacrer à la fabrication des tirants estampés pour avions, spécialité dont elle s'occupe depuis 1907. Elle fabrique actuellement tous genres de câbles et de tirants profilés, haubans, chapes, tendeurs, câbles pour commandes, et accessoires analogues, et prend des soins tout particuliers afin que tous ses produits puissent échapper aux dangers de l'oxydation.

Maison se chargeant de la fourniture de pièces détachées en caoutchouc pour la construction des avions, telles que : tuyaux à essence et à huile, tubes Pitot, cordons sandow, bagues et buttoirs pour amortisseurs. On peut encore citer l'invention récente d'un câble spécial pour le lancement des planeurs.

Fabricants de cadrans et d'échelles graduées en tous genres, également d'insignes émaillés, d'écriteaux industriels, ainsi que de pancartes et étiquettes d'une grande diversité, en toutes matières.

L'hélice Fairey en métal, formée d'une seule pièce, supprime toutes les difficultés qu'occasionne l'emploi des pales amovibles, et, en permettant l'adoption de profils très fins aux extrémités des pales, donne une hélice qui, non seulement très robuste, atteint un coefficient de rendement très élevé. La maison Fairey construit aussi un support de mitrailleuse à tir rapide, d'une forme telle qu'on a la possibilité de l'installer sans contrarier le profil du fuselage, tout en offrant au mitrailleur un champ de tir beaucoup plus large qu'il n'était possible avec les supports d'ancien type. Ce support ne pèse d'ailleurs que 10,88 kgs., et sa construction permet au mitrailleur de manœuvrer son arme sans avoir besoin de se tenir debout dans le courant d'air.

Les toiles de lin pour aéroplanes de la marque "Sintona" se font en lin d'Irlande de la meilleure qualité, et sont vendues dans le monde entier par Gates & Co. La maison a toujours à exécuter d'importants contrats de fourniture pour le Gouvernement britannique, et cette toile est employée par tous les constructeurs d'avions les mieux connus.

Fournisseurs d'articles en caoutchouc en tous genres, utilisés dans l'aviation, de fabrication conforme aux cahiers des charges du Ministère de l'Air de Grande Bretagne, tels que : cordons sandow pour amortisseurs, cordons de suspension en caoutchouc, tubes de caoutchouc, etc.

Les accessoires de cabine les plus divers, ainsi que les pare-brise de tous types à glaces Triplex constituent les spécialités de cette maison. Elle est en train d'exécuter d'importants con-

BRUNTONS,

Musselburgh, Scotland.

THIS Company was the first in this country to produce swaged tie rods for aircraft which they did as far back as 1907. They now manufacture all types of streamline wires and tie rods, bracing wires, fork-ends, turn-buckles, control cables and similar fittings, while particular attention is paid to make all parts corrosion proof.

BURLEY, LTD.,

192, Tottenham Ct. Rd., London, W.1.

RUBBER components for aircraft such as petrol, oil, and pitot tubing; shock absorber, cord, rings and buffers; can be obtained from this firm. A new invention is a special launching rope for gliders.

CAXTON NAMEPLATE CO.,

11, Rochester Row, London, S.W.1.

MANUFACTURERS of dials and scale plates of all types as well as enamel badges, trade plates, and a variety of labels in all materials.

FAIREY AVIATION CO., LTD.,

Hayes, Middlesex.

THE Fairey metal airscrew is formed of a single piece which obviates difficulties arising from the use of detachable blades and enables very fine blade sections to be used at the tips, thus producing a robust yet highly efficient airscrew. Faireys also manufacture a high-speed gun mounting. This is of such a shape which allows it to be installed so that it does not interfere with the streamline of the fuselage, and at the same time enables the gunner to fire over a larger field than was possible with the older types of mounting. The mounting weighs only 24 lb., and its design enables the gunner to operate his gun without standing up in the air stream.

J. W. GATES & CO.,

133, Oxford Street, London, W.1.

AEROPLANE linen fabrics bearing the trade name of "Sintona," and manufactured from fine Irish linen, are sold throughout the world by Gates & Co. Large contracts have continuously been completed for Government use, and this fabric is used by all the best-known aircraft manufacturers.

INDUSTRIAL RUBBER MFR. LTD.,

191, Tottenham Ct. Rd., London, W.1.

SUPPLIERS of every description of rubber product used in aircraft and made to Air Ministry specifications, such as shock-absorber cord, rubber suspension cord, rubber tubing, etc.

INSHAW ACCESSORIES, LTD.,

68, Farm Lane, London, S.W.6.

CABIN fittings in great variety and wind screens of all types using Triplex Glass are the speciality of this

Esta fué la primera compañía que, en Inglaterra, se dedicó a la producción de tirantes estampados para aparatos de aviación, la cual se comenzó en tiempo tan remoto como el año 1907. En la actualidad se ocupa de la fabricación de todos los tipos de alambres de sección que no presenta resistencia a la corriente de aire, tirantes, alambres de refuerzo, extremos de horquilla, torniquetes, cables de mando y otros herrajes semejantes, prestándose atención especial a que todas las piezas sean de acabado a prueba de la oxidación.

Casa que se dedica a proveer componentes de caucho para la construcción de aviones, tales como : tubos para gasolina y aceite, tubos Pitot; cordones sandow, anillos y toques para amortizadores. También se puede citar una invención reciente de un cable especial para el lanzamiento de planeadores.

Fabricantes de esferas y escalas graduadas de todos los tipos, así como también de divisas y placas comerciales esmaltadas y una variedad de rótulos hechos de todos los materiales.

La hélice tipo Fairey, hecha de metal, está formada de una sola pieza lo cual elimina todas las dificultades que se originan por el uso de palas desmontables, permitiendo al mismo tiempo que se empleen en las puntas secciones muy finas de pala dando lugar a la producción de una hélice muy robusta a la par que eficiente. La casa Fairey se ocupa igualmente de la fabricación de una montura para ametralladora de alta velocidad. Esta montura está dotada de una forma tal que la permite ser instalada de manera que no estorbe el delineado de corriente del fuselaje, pero permitiendo al mismo tiempo que el artillero disponga de un campo de fuego mucho mayor de lo que era posible con las monturas de los tipos anticuados. La montura tan sólo pesa 10,88 kilos, mientras que su diseño permite que el artillero maneje su ametralladora sin tener que ponerse de pie en la corriente de aire.

La casa Gates & Co. vende en todo el mundo tejidos de hilo para aeroplanos que llevan la marca de fábrica "Sintona" y que son fabricados del mejor hilo irlandés. Constantemente se han llevado a cabo contratos importantes celebrados con el Gobierno de la Gran Bretaña, y este tejido lo usan las empresas más importantes en el ramo de la aviación.

Esta casa se dedica a la fabricación y venta de todas clases de productos de caucho que se emplean en la industria de la aviación, y se conforman a las especificaciones del Ministerio Británico de Aviación. Entre otras de sus producciones se pueden citar : cuerdas de caucho para amortiguadores de choque, cuerdas de caucho para la suspensión, tubería de caucho, etc.

Esta casa se dedica especialmente a la fabricación de estensos surtidos de guarniciones para cabinas y cristales corta-viento "Triplex" de todos los tipos. Ahora se ocupa intensamente en

trats pour l'agencement intérieur de la plupart de nos avions civils.

Cette maison s'occupe depuis 1917 de la construction d'hélices à pales creuses en acier, de profil bi-convexe. On revendique en faveur de ce type d'hélice de nombreux avantages, dont le principal est constitué par une grande douceur de fonctionnement, précisément par suite de la forme de la pale, qui échappe à tout ébranlement nuisible par suite de son évidage. Cette construction offre également cet autre avantage que, les pales étant amovibles et grâce à la méthode employée pour les fixer au moyeu, il est possible de les régler rapidement et facilement selon tout autre pas désiré. Enfin, l'aviateur particulier n'a besoin d'emporter comme rechange qu'une seule pale au lieu d'une hélice entière.

Toutes pièces détachées normales AGS pour avions, en acier doux, inoxydable, haute résistance, au carbone, ou bien en duralumin, laiton et cuivre rouge. Parmi ces pièces, on peut citer : boulons, écrous, boulons à œil, goupjons, goupilles, coniques fendues ou non, chapes, vis, cosses, rondelles, jumelles, etc.

La maison Rubery Owen est l'une des plus anciennes qui se consacrent à la fabrication des pièces détachées, des genres les plus divers, pour avions, telles que : boulons, écrous, tendeurs, boulons à œil, jumelles, goupilles, rondelles, chapes, fils profilés et pièces AGS en tous genres. De plus, tous ces articles peuvent se fournir en acier inoxydable, soit de la qualité Frith's *staybrite*, soit de toute autre marque, et, lorsqu'il s'agit de pièces en acier doux ordinaire, les fabricants veillent tout particulièrement à en prévenir l'oxydation en les plaquant au cadmium, ou bien en leur faisant subir tous autres traitements appropriés.

Les pare-brise en glace Triplex ainsi que les lunettes en verre de la même marque, dont connus dans le monde entier. Il est probable que c'est à la Société Triplex que revient l'honneur d'avoir créé le verre de sûreté, et, en dépit de nombreuses imitations, la demande dont ses fabrications sont l'objet n'a nullement l'air de vouloir se ralentir.

La maison Vickers figure parmi les plus importants fournisseurs de pièces détachées en tous genres pour avions. L'énumération suivante suffit à donner une idée de la grande diversité des articles que cette société est en mesure de livrer : mitrailleuses et armement ; bombes et mécanisme de lancement ; amortisseurs oléo-pneumatiques ; pompes à huile ; frains ; câbles profilés ; tirants ; tous genres de robinets, soupapes, pompes, filtres et indicateurs de débit pour l'aménagement du combustible ; feux de position ; installations électrogènes pour l'éclairage des appareils d'aviation, et, en réalité, pour ainsi dire n'importe quel genre d'organes employés à la construction des avions.

firm. They are now engaged on large contracts for the interior fittings in most of our civil aircraft.

METAL PROPELLERS, LTD.,

Purley Way, Croydon.

HOLLOW steel-bladed airscrews of biconvex section have been built by this firm since 1917. The advantages of this type of airscrew are claimed to be many, one of the chief of which is smooth running, owing to the shape and freedom from "flutter" of the blade due to the hollow construction. Another advantage is that, owing to the blades being detachable and the method of attaching them to the boss, they are rapidly and easily adjustable for a varying pitch, and further, a private owner need only carry one blade instead of a complete airscrew as a spare.

F. MOUNTFORD, LTD.,

Mosely Street, Birmingham.

ALL standard A.G.S. parts for aircraft from mild, stainless, high-tensile, or carbon steel ; duralumin ; brass and copper. These parts include bolts, nuts, eye-bolts, studs, solid and split taper pins, fork ends, screws, thimbles, washers, shackles, etc.

RUBERY, OWEN & CO.,

Darlaston, South Staffs.

RUBERY, OWEN is one of the oldest established firms for the manufacture of aeroplane components. These include such varied parts as bolts, nuts, turn-buckles, eye-bolts, shackles, pins, washers, fork-ends, stream-line wires, and all manner of A.G.S. parts. These are supplied in Firth's Staybrite and also other forms of stainless steel, and where they are made from ordinary mild steel, particular attention is paid to the prevention of corrosion by cadmium plating or other suitable processes.

TRIPLEX GLASS CO., LTD.,

1, Albemarle Street, London, W.1.

WIND-SCREENS and goggles made of Triplex Safety Glass are now a byword in all parts of the world. Triplex were probably the originators of safety glass, and in spite of many imitations, the demand for their products does not appear to diminish.

VICKERS AVIATION, LTD.,

Broadway, London, S.W.1.

VICKERS are one of the largest suppliers of all types of aircraft components. These comprise such varied things as guns and armament ; bombs and bomb gear ; oleo-pneumatic shock absorbers ; oil pumps ; brakes ; streamline wires ; tie-rods ; all types of cocks, valves, pumps, filters and flow indicators for the fuel installation ; navigation lamps ; generating equipment for aircraft lighting ; and, in fact, almost every class of component associated with aircraft.

la manufactura de guarniciones interiores para cumplir contratos importantes celebrados con la mayor parte de las empresas de aviación civil en Inglaterra.

Esta casa ha construido desde 1917 hélices de acero para aeroplanos, de sección biconvexa y paletas huecas. Se afirma que son muchas las ventajas de este tipo de hélice, siendo una de las principales su funcionamiento uniforme, debido tanto a su forma como a la falta de oscilación de la paleta por causa de su construcción hueca. Otro de las ventajas obedece a que siendo las paletas desprendibles, y como resultado del método de ajustarlas al núcleo, pueden regularse rápida y fácilmente para un paso variable. Además, el dueño particular de un aeroplano necesita solamente llevar una paleta en lugar de una hélice de repuesto completa.

Toda clase de piezas A.G.S. tipificadas para aparatos de aviación, hechas de acero dulce, acero inoxidable, acero de alta resistencia a la tracción, acero al carbono, duraluminio, bronce y cobre ; tales son las especialidades de esta casa. Las referidas piezas incluyen pernos, tuercas, pernos de argolla, muñones, pasadores cónicos sólidos y partidos, extremos de horquilla, tornillos, dedales, arandelas, grilletes, etc.

La casa Rubery Owen & Co. es una de las más antiguas que se dedica a la manufactura de piezas componentes para aparatos de aviación. Entre las referidas piezas se pueden citar pernos, tuercas, torniquetes, pernos de argolla, grilletes, pasadores, arandelas, extremos de horquilla, alambres de sección que no presenta resistencia a la corriente de aire, así como también toda clase de piezas AGS. Todos estos accesorios se suministran en acero "Staybrite" de Firth y en todas las demás formas de acero inoxidable. En aquellos casos en que se fabrican de acero dulce común, se presta atención especial a la protección contra la oxidación por medio del recubrimiento de cadmio o por medio de otros procedimientos apropiados.

Tanto los para-brisas como las gafas hechas de cristal Triplex de seguridad ya son bien conocidos en todas partes del mundo. La sociedad Triplex Safety Glass Co., Ltd., fué quizás la precursora en la fabricación de cristal de seguridad y, a despecho de las numerosas imitaciones, no parece haber disminución alguna en la demanda para sus producciones.

La casa Vickers es una de las que proveen en mayor escala todos los componentes para máquinas voladoras. Comprenden éstas cosas tan diversas como ametralladoras y armamento ; bombas y mecanismo de lanzamiento ; amortiguadores de choques oleo-neumáticos ; bombas para aceite, frenos, alambres perfilados, tirantes, toda clase de grifos, válvulas, bombas, filtros e indicadores del flujo para la instalación del combustible, luces de navegación, equipos generadores para el alumbrado de aviones y, en realidad, casi toda clase de aparatos y accesorios relacionados con la aviación.

CLOTHING

VETEMENTS, &c.

Les vêtements spéciaux pour aviateurs et toutes personnes voyageant en avion sont désormais l'objet d'une attention de plus en plus suivie, non seulement de la part des établissements de fondation ancienne qui se font une spécialité de ce genre d'équipements, mais aussi de celle de nombreuses maisons connues qui, jusqu'à présent, s'occupaient principalement de fournir le personnel de l'Armée et de la Marine. Par le fait, on peut presque affirmer qu'à l'heure actuelle il n'existe guère de grand magasin ou de maison importante d'équipement qui ne soit à la tête d'un rayon spécial, ou tout au moins d'un certain stock de casques, combinaisons, et de tous articles analogues pour l'aviation. Bien entendu, chaque établissement a ses idées particulières au sujet de ce qu'il lui convient le mieux d'offrir à la clientèle, de sorte qu'on peut voir dans les différents magasins une foule d'équipements les plus divers, aussi ingénieux d'ailleurs que confortables. Parmi les maisons les plus importantes de la partie, on peut citer :—

A. W. GAMAGE, LTD.,
Marble Arch, London, W.1.

GIEVES, LTD.,
21, Old Bond Street, London, W.1.

D. LEWIS,
124, Gt. Portland Street, London, W.1.

Il est encore une maison qui s'occupe tout spécialement de la fabrication de lunettes d'aviation, d'après ses propres modèles, et dont les articles ont été utilisés par tant de célèbres aviateurs, à l'occasion d'un si grand nombre de raids retentissants, que tout autre commentaire serait superflu. Voici son nom :—

ALKIT, LTD.,
Cambridge Circus, London, W.C.2.

AUSTIN REED,
113, Regent Street, London, W.1.

BURCH'S,
33, Bedford Street, London, W.C.2.

A firm which specialises in goggles of their own design and whose products have been used by so many well-known airmen in such a vast number of notorious flights as to need no further mention is :—

E. B. MEYROWITZ, LTD.,
1A, Old Bond Street, London, W.1.

ROPAS, &c.

La ropa especial para los aviadores y para aquellas personas que emprenden viajes aéreos está recibiendo en la actualidad una atención siempre creciente, no solamente de parte de aquellas firmas de antiguo establecimiento que se especializan en esta forma de equipos, sino que también de parte de muchas de las casas bien conocidas que hasta la fecha se especializaban principalmente en las necesidades del Ejército y la Marina. En efecto, uno bien podría afirmar que apenas existe un Emporio o Establecimiento de Artículos para Caballeros, que se haya adquirido alguna reputación, que no disponga de un departamento especial o por lo menos mantenga una existencia de cascos, cubre-trajes y otras prendas análogas para la aviación. Como es de suponerse, muchas de estas casas tienen sus propios caprichos en respecto de los equipos necesarios, y en sus salas de exposición se pueden ver muchas formas cómodas e ingeniosas de equipos. Entre las más importantes firmas que pueden mencionarse en este sentido se citan las siguientes :—

S. LEWIS,
27, Carburton Street, London, W.1.

SELFRIDGE & CO., LTD.,
Orchard Street, London, W.1.

W. J. WAINWRIGHT,
300, Euston Road, London, N.W.1.

Damos a continuación el nombre de una casa que se especializa en gafas de sus propios tipos y cuyos productos han sido usados por tantos Aces de la aviación en una infinidad de vuelos notables que es innecesario describirlos en forma alguna :—

DOPE, PAINT AND VARNISH

ENDUITS, PEINTURES ET VERNIS

La British Celanese Ltd. a lancé sur la place toute une série d'enduits à base d'acétate de cellulose, ainsi que des vernis de toutes nuances, conformes à de nombreuses spécifications extrêmement variées. Le Cellastoid est un produit ininflammable, non-décolorant et non-éclatable, à l'aide duquel on a la faculté de fabriquer pare-brise, lunettes et rideaux latéraux. Quant à la Cellastine, autre produit à base de cellulose de la même maison, elle est d'un usage fort répandu pour la fabrication d'écriteaux, cadrans pour instruments, panneaux, etc.

BRITISH CELANESE, LTD.,
Hanover Sq., London, W.1.

BRITISH Celanese, Ltd., have placed on the market, cellulose-acetate dopes and varnishes in all colours and to many and varied specifications. Cellastoid is a non-inflammable, non-discolouring and non-splintering material from which wind-screens, goggles, and side-curtains may be made. Cellastine is another cellulose product of this firm and is widely used for making facia boards, instrument dials, panels, etc.

ADOBOS, PINTURAS Y BARNICES

La British Celanese Ltd., ha lanzado al mercado un material a base de acetato de celulosa, adobos y barnices de todos los colores y de especificaciones muy diversas. El "Cellastoid" es un material ininflamable que no se descolora ni quiebra, y del cual pueden hacerse cristales corta-vientos, gafas y cortinas laterales. "Cellastine" es otro producto de celulosa manufacturado por esta casa, que se usa extensamente para hacer carteles, cuadrantes para instrumentos, paneles, etc.

C'est en 1911 que cette maison a débuté dans la fabrication des enduits pour avions. Elle fabrique donc des enduits à base d'acétate de cellulose et de nitrocellulose, et met à la disposition des intéressés diverses variantes qu'on peut utiliser lorsque les conditions sont défavorables, en prenant ces deux matières comme base. Ces variantes pour conditions défavorables peuvent s'appliquer à n'importe quelle température ambiante, à partir du point de congélation et au-dessus, ou bien au sein d'une humidité relative égale à 90%. La maison fournit également les peintures "Cerric" à émailler, ainsi qu'une grande diversité d'enduits et de peintures-émail contenant des matières colorantes.

Fondée en 1788 pour la fabrication du verre et des couleurs, cette maison, dont les affaires ont pris un développement très rapide, fournit actuellement peintures, vernis et enduits conformes à toutes spécifications, pour les industries de l'aéronautique. Elle a également la représentation du verre de sûreté Lancegaye, qui ne comporte sur les bords aucun joint d'un aspect déplaisant, conserve toujours parfaitement sa couleur première, et est extrêmement léger.

Le vernis "Rylard" constitue l'un des principaux produits de cette maison et il a été prouvé, à la suite d'essais très complets, que ce vernis est imperméable et qu'il résiste parfaitement aux intempéries. D'un usage actuellement fort répandu pour la protection des avions métalliques, il donne des résultats particulièrement heureux sur le duralumin, et jouit donc d'une faveur spéciale pour le parachèvement des coques et flotteurs fabriqués à l'aide de ce métal.

Voici une autre maison qui peut fournir tous genres d'enduits à base de cellulose, et les peintures-émail à base d'huile. Elle met également en vente de nombreuses qualités de vernis appropriés au finissage des instruments en métal, des hélices, des capotages de moteurs, des radiateurs, et, par le fait, pour le parachèvement de toutes autres pièces susceptibles de s'utiliser à la construction des avions.

CELLON, LTD.,

Kingston-on-Thames.

THIS firm first started manufacturing dope for aircraft use in 1911; by them cellulose-acetate and cellulose-nitrate dopes are made, and schemes for use under adverse conditions are available with both these materials as a base. These adverse schemes can be applied in any temperature from freezing point upwards, or in a relative humidity of 90 per cent. "Cerric" lacquers and also pigmented dopes and lacquers in great variety are available.

J. HALL & SONS, LTD.,

Bristol.

ESTABLISHED in 1788 as glass workers and paint manufacturers, this Company, whose business has increased rapidly, now supplies paints, varnishes, and dopes to all specifications for the aircraft trade. They are also agents for the Lancegaye safety glass, which has no unsightly sealing at the edge, maintains a perfect colour, and is extremely light.

LLEWELYN RYLAND, LTD.,

Balsall Heath, Birmingham.

"RYLAND" varnish is one of the chief products of this firm, and under extensive tests it has proved itself waterproof and weather-resisting. It is now widely used for the protection of metal aircraft, particularly duralumin, and has found great favour as a finishing coat for duralumin hulls and floats.

NOBEL CHEMICAL FINISHES, LTD.,

Slough, Bucks.

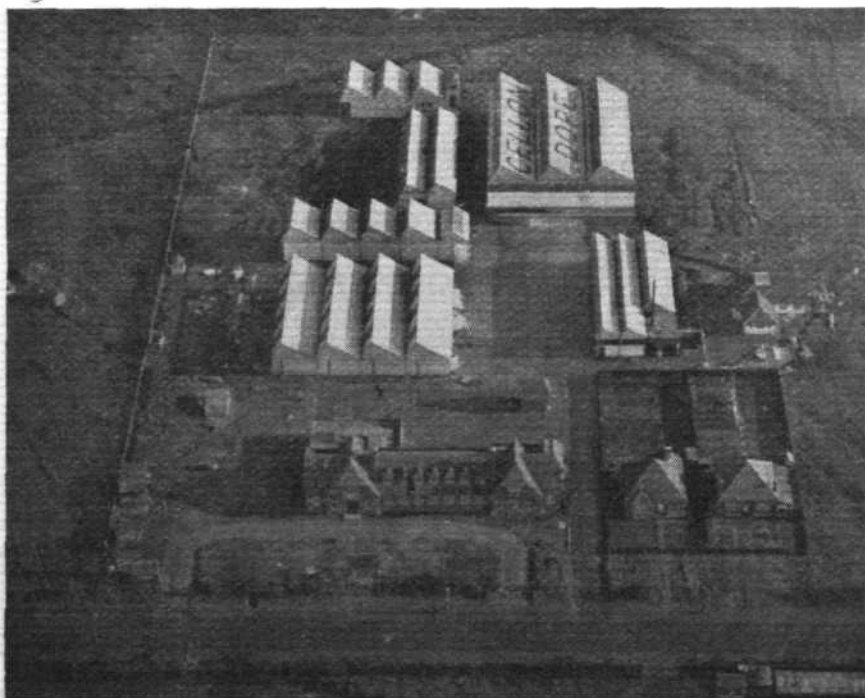
ANOTHER firm which supplies every variety of cellulose dopes and oil enamels is Nobel. They have many finishing varnishes suitable for metal instruments, airscrews, engine cowling, radiators and, in fact, all other parts of aircraft.

Esta empresa comenzó en 1911 la manufactura de adobos para aviones. Produce ahora adobos a base de acetato de celulosa y nitrocelulosa, y tiene a la disposición de la industria de la aviación compuestos, a base de estos materiales, para su aplicación en condiciones desfavorables. Dichos compuestos pueden usarse en cualquier temperatura, desde el punto de congelación en adelante, o en una humedad relativa de 90%. La compañía dispone de existencias de lacas "Cerric," adobos conteniendo sustancias colorantes y lacas de diferentes clases.

Fundada en 1788 para dedicarse a la fabricación de vidrio y pinturas, esta Compañía, cuyo negocio ha aumentado rápidamente, suministra ahora colores, barnices y adobos de todas clases para la industria de la aviación. Tiene también la representación del vidrio de seguridad "Lancegaye," el cual carece de juntas desagradables en los bordes, mantiene un color perfecto y es sumamente ligero.

El barniz "Rylard" es uno de los productos principales de esta casa, y ha demostrado, mediante los más completos experimentos, su impermeabilidad y resistencia perfecta a la intemperie. Se usa ahora extensamente para la protección de aviones de metal, sobre todo los construídos de duraluminio, y ha encontrado gran aceptación como capa final para los cascos y flotadores, de este metal.

La empresa Nobel es otra de las que suministran una gran variedad de adobos de celulosa y de esmaltes a base de aceite. Tiene muchos barnices de acabado adecuados para instrumentos de metal, hélices para aviones, capotas de motores, radiadores y, en general, para todos las demás componentes para aviones.



Aerial views of the Cellon Works (left), and John Hall's Works (right).

Vues aériennes : Usines Cellon (gauche) et Usines John Hall (droite).

Vistas aéreas :—Fábricas Cellon (izquierda), y Fábricas John Hall (derecha).

Cette entreprise a été fondée en 1915, sous la dénomination de The British Aeroplane Varnish Co., et est actuellement à la tête de fabriques aux Etats-Unis, en Italie, et en Allemagne. Elle fournit tous genres d'enduits et de vernis de finissage, d'un emploi très satisfaisant, non seulement sur les entoilages, mais également sur bois de contreplacage et métaux. Parmi les autres genres de vernis livrés par cette maison, on peut citer: peintures résistant aux attaques de l'essence, de l'huile et des enduits, ainsi qu'un émail spécial qui, en dehors des qualités précitées, résiste parfaitement à l'eau de mer et fait preuve d'une bonne ténacité à résister aux encrassages, de sorte qu'il est d'un emploi tout particulièrement indiqué pour les flotteurs et coques d'hydravions.

TITANINE-EMAILITE, LTD., 175, Piccadilly, London, W.1.

TITANINE-Emallite were established in 1915 under the name of The British Aeroplane Varnish Co., and now have factories in U.S.A., Italy, and Germany. They supply all types of dopes and finishing varnishes which are satisfactory for use not only on fabric, but also on ply-wood and metal. Other forms of varnish supplied by them are their petrol oil and dope-resisting paints, and a special lacquer which, in addition to the above qualities, is sea-water-resisting and tends to resist fouling and is therefore peculiarly suitable for sea-plane floats and hulls.

Esta empresa fué fundada en 1915 bajo la razón social de The British Aeroplane Varnish Co., y actualmente tiene fábricas en los Estados Unidos, en Italia y Alemania. Suministra adobos y barnices de todas clases, que dan resultados muy satisfactorios no solamente aplicados a los tejidos sino también a las maderas contraplacadas y al metal. Otras de las clases de barnices que suministra esta casa son sus pinturas resistentes a la acción del aceite y del adobo, y una laca especial que, además de poseer las cualidades antes mencionadas, ofrece gran resistencia al agua del mar y tiende igualmente a resistir la suciedad. Es, pues, especialmente adecuada para los flotadores y los cascos de los hidroplanos.

FUEL, OIL AND GREASE

COMBUSTIBLES, HUILES ET GRAISSES

De toutes les maisons se consacrant à la fourniture des différents produits qu'exige le fonctionnement des appareils d'aviation, il n'y en a guère qui, autant que les fournisseurs d'huile et d'essence, aient bénéficié de la publicité que suscitent les grands records de l'air et les raids retentissants de l'aviation. Toutes les grandes maisons connues fournissent des combustibles conformes à différentes spécifications et susceptibles de répondre aux exigences des moteurs de toutes catégories. En outre, bien qu'en Angleterre la quantité totale d'essence utilisée ne soit pas très considérable, ces maisons n'en ont pas moins jugé qu'il valait la peine de s'organiser un département spécial d'aviation, et, dans bien des cas, elles possèdent même leurs propres avions. Depuis quelques années, comme on a fini par abandonner peu à peu l'idée qu'il est nécessaire d'employer de l'huile de ricin pour les moteurs d'aviation ordinaires, presque toutes les maisons de la partie se consacrent principalement à la fabrication d'une huile minérale conforme à la spécification D.T.D. 109 du Ministère de l'Air de Grande Bretagne, spécification imposant certains des essais les plus intéressants que l'on connaisse au monde quant aux huiles pour moteurs d'aviation. Parmi les maisons s'occupant surtout de fournir le combustible, bien que bon nombre d'entre elles fournissent également des huiles de graissage, on peut citer :—

REDLINE MOTOR SPIRIT,
16, Charles St., London, S.W.1.

tandis que les maisons les plus importantes qui se consacrent à la fourniture des huiles et graisses pour avions, sont les suivantes :—

SILVERTOWN LUBRICANTS,
4, Lloyds Av., London, E.C.3.

TECALEMIT, LTD.,
Willesden, London, N.W.

FEW firms supplying commodities required in the operation of aircraft have been given as much publicity from record flights and similar feats as have the vendors of oil and petrol. All the well-known firms supply fuel to various specifications to suit all kinds of engines, and although in this country the total amount of fuel used is not very large, yet at the same time all the firms have considered it worth their while to form special aviation departments, and in many cases to operate their own aircraft. Within recent years the necessity of a castor oil for use in ordinary aircraft engines has been discredited, and nearly all the firms are now making as their main line a mineral oil which conforms to the Air Ministry specification D.T.D. 109; which involves some of the most interesting tests in the world for aero engine oils. Among the firms whose chief commodity is fuel, though in many cases they supply oil as well, may be mentioned :—

ANGLO-AMERICAN OIL CO.,
36, Queen Anne's Gate, London, S.W.1.

B.P. LTD.,
165-167, Moorgate, London, E.C.

while the chief firms who supply lubricating oil and grease for aircraft are :—

W. B. DICK & SONS,
26, Grosvenor Gdns., London, S.W.1.

A. DUCKHAM & CO.,
6, Broad St. Pl., London, E.C.3.

COMBUSTIBLES, ACEITES Y GRASAS

De todas las casas que se dedican a suministrar los productos necesarios a la aviación, pocas han alcanzado el mismo grado de publicidad que las proveedoras de aceite y gasolina, con motivo del interés suscitado en el empeño de batir los records del aire y en otros acontecimientos semejantes. Las casas más prominentes suministran combustible conforme a especificaciones diversas para motores de todas clases, y aunque el consumo total de gasolina no sea muy considerable en la Gran Bretaña, todas las compañías han creído conveniente formar departamentos especiales de aviación, y aun en muchos casos poseen sus propios aeroplanos. En los últimos años se ha abandonado la idea que existía sobre la necesidad de procurar aceite de ricino para usarlo en motores de aviación ordinarios, y casi todas las casas de este ramo se dedican ahora a la producción de un aceite mineral que se ajusta a la especificación D.T.D. 109 del Ministerio de Aviación, la cual envuelve algunas de las pruebas más interesantes que se han hecho en el mundo con aceites para motores de aviones. Entre las casas cuyo producto principal es el combustible—aunque en muchos casos también suministran aceite de lubricación, pueden citarse las siguientes :—

NATIONAL BENZOLE CO.,
Buckingham Gate, London, S.W.1.

SHELL-MEX LTD.,
Kingsway, London, W.C.2;

mientras que las casas principales que suministran grasa y aceite de lubricación para aeroplanos son :—

C. C. WAKEFIELD & CO.,
30, Cheapside, London, E.C.

VACUUM OIL CO.,
Caxton House, London, S.W.1.

GENERAL ACCESSORIES

ACCESSOIRES GÉNÉRAUX

Cette maison s'occupe de la fabrication de tous genres de modèles d'avions à l'échelle, en métal et en argent, ainsi que de plaques d'identité émaillées, gravées et en ivoire; insignes émaillés les plus divers; trophées, coupes, objets d'art et fétiches de toutes sortes

La maison Bonnella est en mesure de fournir une très grande diversité de pièces détachées pour avions, agencements électriques, y compris éclairage, T.S.F., allumage et raccords, de même que tous genres de lampes pour postes de pilotage, régulateurs d'éclairage, douilles et fiches, agrafes pour câbles, bouchons de contact, pattes d'attache pour bornes, boîtes de raccordement, et conducteurs blindés pour l'allumage.

Les parachutes "Lobe" fabriqués par cette compagnie sont aujourd'hui extrêmement connus. Les avantages de la forme "Lobe" résultent de l'absence de tout balancement même lorsque le parachute sert à une descente après "enlèvement." Se fournissent en les deux modèles de siège et de dos, et il existe en outre un modèle en coton à l'intention des pilotes propriétaires et autres intéressés, pour qui la question de prix est un point important. M. John Trantum, démonstrateur de la maison, a effectué environ neuf cents descentes, et son nom est familier à tous les aviateurs anglais. La Compagnie vient de perfectionner un dispositif éjecteur central, grâce auquel l'aviateur peut se libérer immédiatement de tout le harnachement à l'aide d'une seule main. C'est là un perfectionnement de très grande importance, qui amoindrit considérablement les risques d'accidents à l'usager par vents forts, alors qu'il pourrait être traîné contre des obstacles dangereux, ou en cas de descente sur l'eau.

BIRMINGHAM MEDAL CO., LTD.,
Frederick St., Birmingham.

ALL types of metal and silver scale models of aircraft are made by this Company as well as enamelled, etched and ivory nameplates, enamelled badges of all types and all forms of trophies, presentation gifts and mascots.

D. H. BONNELLA & SON, LTD.,
46, Osnaurgh St., London, N.W.1.

COMPONENT parts for aircraft, electrical equipment, including lighting, wireless, ignition and bonding are supplied by Bonnella, as well as all types of cockpit lamps, dimmers, sockets and plugs, cable clamps, adaptors, terminal lugs, joint boxes and screened ignition leads.

BRITISH RUSSELL PARACHUTE CO.,

432, Edgware Road, London, N.W.2.
"LOBE" parachutes made by this Company are now extremely well known. The advantages of the "Lobe" shape are the absence of swinging even when the chute is used for a pull-off descent. Both the seat and back-pack types are supplied, and a further model in cotton is available for private owners and others to whom cost is an important item. Mr. John Trantum, demonstrator of this firm, has made some nine hundred drops, and is well known to all airmen here. A central release connection has recently been perfected whereby the wearer may immediately release the whole of the harness by the use of one hand only. This is of very great importance, and greatly lessens the risk of damage to the wearer in high winds where he is likely to be dragged against dangerous objects or when descending in the water.

ACCESORIOS EN GENERAL

Esta compañía fabrica toda clase de modelos para aviones de escala, en metal y plata, así como también placas de identidad esmaltadas, grabadas y de marfil; insignias esmaltadas de los tipos más diversos; trofeos, objetos de arte y mascotas de todo género.

La casa Bonnella suministra partes componentes para aviones, equipos eléctricos, incluyendo alumbrado, telegrafía sin hilos, encendido y conexiones, así como también toda clase de tipos de lámparas para el puesto del piloto, amortiguadores de luz, cajas y clavijas de contacto, grapas para cables, colas de unión, cajas de contacto y conductores protegidos para el encendido.

Los paracaídas "Lobe" que fabrica esta Compañía son actualmente muy conocidos. Las ventajas del tipo "Lobe" consisten en la ausencia de la oscilación, aun cuando el piloto haya sido levantado del aparato por el paracaídas. Se suministran tanto los tipos de asiento como los de amarre a la espalda, habiendo además un modelo para propietarios particulares y para todos aquellos que tienen que considerar el costo. Mr. John Trantum, demostrador de esta casa, ha efectuado unas novecientas caídas y lo conocen todos los aviadores en Inglaterra. Se ha perfeccionado recientemente una conexión central de soltura, mediante la cual suelta inmediatamente, él que la lleva, todo el equipo con una sola mano. Esto es de la mayor importancia y disminuye grandemente el riesgo de la persona que tiene que descender en tiempo borrascoso y que puede ser lanzada contra objetos peligrosos o cuando se trata de descender sobre el mar.



A Williamson Pistol Camera and its work, and (above) 3 types of Moseley Float-on-Air Cushions.

Appareil photo-revolver Williamson et son résultat. Haut :—3 types de coussins "Float-on-Air" Moseley.

Aparato Williamson tipo pistola y su trabajo. Arriba :—3 tipos de cojines "Float-on-Air" Moseley.

Les perceuses à air comprimé que fabrique la maison Desoutter s'emploient dans un très grand nombre d'usines d'aviation. Petites et d'un faible encombrement, ces machines n'exigent que 0^{kg} 1133 d'air frais à la minute, à la pression de 5^{kg} 625 à 7^{kg} 030 au centimètre carré. Elles peuvent s'utiliser d'une seule main, leur entraînement étant assuré par une machine à cinq cylindres, ne comportant ni tête ni pied de bielle, ni bielle ou vilebrequin, et n'ayant qu'un seul palier, à savoir un roulement à billes.

Les extincteurs d'incendie fabriqués par cette compagnie ont été adoptés par l'Aviation Royale de Grande Bretagne. Tout particulièrement légers, ils ne donnent naissance à aucune émanation délétère, leur fermeture est hermétique, et il leur est impossible de se déranger.

Les parachutes Irvin font partie de l'équipement normal de l'Aviation Royale de Grande Bretagne depuis bien des années, et, en outre, ils ont été adoptés par plus de trente gouvernements de l'étranger. Parmi les créations les plus récentes de cette maison, on peut citer les trois types suivants: Le "Caterpillar Chute," pouvant servir de siège, se porter sur les genoux ou sur le dos, et conçu tout spécialement à l'intention des aviateurs particuliers. Le "Quick Connection" qui—ainsi que son nom l'indique en anglais—constitue un parachute normal, susceptible de s'attacher au harnais ou de s'en détacher très facilement, pour se suspendre à portée de la main. Le "Form-Fitting Back Pack," variante destinée aux avions à cabine et que l'on suspend au-dessus du siège de chaque passager, le harnais étant disposé de chaque côté, de sorte qu'en cas de danger il soit très facile d'endosser rapidement le harnais. Il est encore une nouveauté que cette société s'occupe actuellement de mettre au point, et c'est un dispositif de déclenchement rapide grâce auquel tout le harnais peut se séparer d'une attache centrale, en permettant ainsi au parachutiste de s'écarter sans retard, comme par exemple en cas de descente sur l'eau.

Les coussins Moseley "Float-on-Air," désormais d'un usage extrêmement répandu pour l'agencement des appareils d'aviation, tant militaires que civils, constituent l'un des dispositifs les plus légers et pourtant les plus efficaces que l'on connaisse pour assurer le confort du pilote comme celui des passagers.

L'extincteur d'incendie Pyrene est un appareil à pompe, contenant un liquide spécial qui se conserve indéfiniment en parfait état. Il existe également un appareil de plus grandes dimensions, connu sous la désignation de "Phomene," destiné à s'employer dans les hangars et magasins. D'une capacité d'environ 9 litres de liquide, il donne naissance à un peu plus de 72 litres d'une mousse dont la composition chimique lui permet d'étouffer les flammes.

Autre maison qui se fait une spécialité de l'édition de cartes pour avions, rendues imperméables grâce à un procédé spécial, et mettant à contribution l'emploi de la cellulose.

DESOUTTER BROS., LTD.,

Hendon, London, N.W.9.

PNEUMATIC drills made by Desoutter are used in a large number of aircraft works. They are small and compact and take only 4 ft. of free air per minute at 80-100 lb. pressure. They can be operated by one hand and are worked by a five-cylinder machine with no bigends, smallends, connecting rods, or crankshaft, and only one bearing—a ballrace.

ESSEX FIRE EXTINGUISHER CO., LTD.,

20, Essex St., London.

FIRE Extinguishers made by this Company are used by the Royal Air Force and are particularly light in weight, do not give off poisonous fumes, are hermetically sealed, and cannot get out of order.

IRVING AIR CHUTE CO., LTD.,

Letchworth, Herts.

IRVIN air chutes have been for many years the standard equipment of the Royal Air Force and are used by over thirty Governments. Three of the latest types emanating from this firm are the Caterpillar chute, which may be worn as a seat, lap or back-pack, and has been specifically designed for private owners' use. The Quick Connector is, as its name implies, a standard chute which can be easily attached or detached from the harness and slung within convenient reach when not being worn. The Form-Fitting Back-Pack is an alternative design for cabin aircraft. In this form the chute is slung over the passenger's chair with the harness each side, and in case of danger this harness can be very simply and rapidly secured. A further modification, which is being investigated by the Company, is a form of quick release, whereby the whole harness can be detached from one central connection, thereby allowing the wearer to get clear when, for example, alighting in water.

D. MOSELEY & SONS, LTD.,

Ardwick, Manchester.

MOSELEY float-on-air cushions are now widely used in aircraft, both in the Service and in Civil aircraft, and provide one of the lightest yet most efficient means of comfort for the pilot or passengers.

PYRENE & CO., LTD.,

9, Grosvenor Gdns., London, S.W.1.

THE Pyrene fire extinguisher is a pump operated article containing a special fluid which remains in good condition indefinitely. A larger type called the "Phomene" is made for use in hangars and stores. It has a liquid capacity of two gallons and generates about 16 gallons of foam, which is of the fire smothering type.

RAYNOIL MAPS, LTD.,

High Holborn, London, W.C.2.

ANOTHER firm who specialises in maps for aircraft use rendered waterproof by some cellulose process, is Raynoil Maps, Ltd.

Las taladradoras de aire comprimido de la casa Desoutter se usan extensamente en numerosas fábricas de aviación. Son pequeñas y compactas, y solo requieren 0.1133 m. cub. de aire libre a una presión de 5.625 a 7.030 kg por centímetro cuadrado. Pueden manejarse de una sola mano y se hacen funcionar mediante una máquina de cinco cilindros, que no comporta ni cabeza ni pie de biela, ni biela o cigüeñal, no teniendo más que un cojinete, es decir, un rodamiento de bolas.

Los extinguidores de incendios que fabrica esta compañía han sido adoptados por el Cuerpo de Aviación de la Gran Bretaña. Son de un peso especialmente ligero, no despiden vapores deletéreos, están herméticamente cerrados y no pueden descomponerse.

Los paracaídas Irvin constituyen desde hace muchos años el equipo normal del Cuerpo de Aviación de la Gran Bretaña, y han sido también adoptados por más de treinta gobiernos extranjeros. Entre los últimos tipos procedentes de esta empresa pueden citarse los tres siguientes: el "Caterpillar," que puede servir como asiento, o para llevarlo sobre las rodillas o la espalda, y se ha diseñado especialmente para aviadores particulares. El "Quick Connection," como su nombre lo indica, es un paracaídas normal que puede fijarse fácilmente a las guarniciones o desprenderse de ellas, y colgarlo a poca distancia de la mano mientras no se usa. El "Form-Fitting Back-Pack" es un diseño alternativo para aviones de cabina. En esta forma, el paracaídas se suspende sobre el asiento de los pasajeros con las guarniciones a cada lado, y en caso de peligro éstas pueden ajustarse con facilidad y rapidez. Otra modificación que actualmente está examinando la Compañía es una forma de soltura rápida que permite separar de una conexión central toda la guarnición, pudiendo así el que la lleva desprenderse de ella cuando, por ejemplo, desciende en el agua.

Los cojinetes "Float-on-Air" Moseley se usan ahora extensamente en los aviones, tanto militares como civiles, y proveen uno de los medios más ligeros y eficientes para la comodidad del piloto o de los pasajeros.

El extinguidor de incendios Pyrene es un aparato que funciona como una bomba y contiene un fluido especial que permanece indefinidamente en buenas condiciones. Para uso en los hangares y almacenes se construye un extinguidor de mayores dimensiones, conocido con el nombre de "Phomene." Tiene una capacidad aproximada de 9 litros de líquido y genera más de 72 litros de espuma, cuya composición química le permite sofocar la llama.

Esta es otra de las casas que se dedican especialmente a la edición de mapas para la aviación, los cuales se hacen impermeables mediante algún procedimiento a base de celulosa.

L'appareil Reid à éprouver les pilotes est très employé aujourd'hui dans les services de l'Aviation Royale de Grande Bretagne, ainsi qu'en de nombreux autres pays. On a constaté qu'il donne une très bonne indication des aptitudes pour le pilotage de ceux qui y sont soumis. Le comité de sélection et de classement a ajouté cet appareil à son équipement normal. Cette maison construit aussi un tableau éclairé élastique, utilisant un mode de montage breveté qui réduit considérablement les risques auxquels sont exposés les instruments et en prolonge la durée. Citons encore un autre instrument sortant de cette fabrique, à savoir son chronographe de précision portatif, appareil de chronométrage donnant le millième de seconde pour les parcours d'une heure de durée.

Short & Mason fournissent des instruments de tous genres pour l'aviation et notamment les instruments destinés aux observations météorologiques. Un des mieux connus est leur Météorographe Dines pour l'étude des hautes régions de l'atmosphère, employé à l'observatoire de Kew.

Très connue parmi les plus importants constructeurs d'appareils pour scaphandriers, cette maison fournit maintenant des appareils respiratoires à oxygène comprimé et liquide pour aviateurs, ceintures de sauvetage en mer, manomètres, accessoires pour équipements photographiques, chambres à vide et pneumatiques pour l'essai des instruments, pompes foulantes à oxygène pour le remplissage des bouteilles à oxygène, cantines de secours, et petites embarcations pliantes.

REID & SIGRIST, LTD.,

Kingston, Surrey.

THE Reid pilot testing apparatus is now widely used in the R.A.F. and many foreign countries. It has been found to give a very good indication of the piloting capabilities of those tried out on it. The selection and grading Committee now include this apparatus among their standard equipment. A resilient illuminated dashboard is another production of this firm which utilises a patented form of mounting, largely decreasing the risk to the instruments and increasing their life. Yet another instrument emanating from this factory is their portable precision chronograph, which is a timing apparatus reading to 1,000th of a second for runs of one hour duration.

SHORT & MASON, LTD.,

Walthamstow, London, E.17.

AVIATION instruments of every type, and particularly those for meteorological use are supplied by Short and Mason. Among the best known is their Dines Meteorograph, for investigation of the upper air, such as is being used at the Kew Observatory.

SIEBE, GORMAN & CO., LTD.,

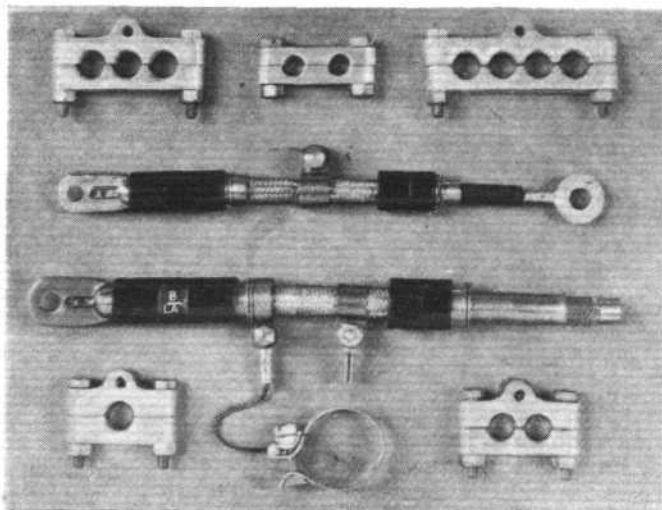
187, West'ster Bdge. Rd., London, S.E.1.

WELL-KNOWN as one of the largest producers of diving apparatus, this firm now supplies compressed and liquid oxygen breathing apparatus for airmen, marine life-saving belts, pressure gauges, photographic equipment accessories, vacuum and pressure chambers for instrument testing, oxygen pressure pumps for filling oxygen cylinders, first-aid outfits, and collapsible dinghies.

El aparato "Reid" para probar pilotos se usa extensamente en el Cuerpo de Aviación de la Gran Bretaña y de muchos países extranjeros. Se ha hallado que da muy buena idea de la capacidad de los pilotos que se prueban con él. El Comité de selección y clasificación incluye actualmente este aparato entre su equipo normal. Un tablero elástico iluminado es otro de los artículos fabricados por esta casa que utiliza una forma patentada de montaje, con el resultado de que disminuye el riesgo de los instrumentos y aumenta su duración. Su fábrica produce igualmente un cronógrafo portátil de precisión, que es un aparato indicador de tiempo graduado hasta una milésima de segundo para recorridos de una hora de duración.

La Compañía Short & Mason suministra instrumentos de aviación de todos los tipos, especialmente los que se necesitan para usos meteorológicos. Entre los más conocidos se cuenta su Meteorógrafo "Dines" para la investigación del aire a grandes alturas, como el que usa actualmente el Observatorio de Kew.

Bien conocida como una de las más importantes en la construcción de aparatos para bucear, esta casa se dedica ahora también a la provisión de aparatos respiradores de oxígeno comprimido y líquido para aviadores, salvavidas para la mar, manómetros, accesorios para equipos fotográficos, cámaras a vacío y neumáticas para pruebas de instrumentos, bombas de presión para oxígeno para llenar los frascos de oxígeno, equipos de primeros auxilios en caso de accidente y pequeños botes plegadores.



A selection of electrical fittings by Bonnella and two parachutes, the Russell (left) and the Irvin (right).

Choix d'accessoires électriques Bonnella, et deux parachutes : Russell (gauche) et Irvin (droite).

Selección de accesorios eléctricos Bonnella, y dos paracaídas :—Russell (izquierda) é Irvin (derecha).

Les cartes Stanford pour l'aviation sont traitées au procédé "Lutra" qui les rend imperméables et inusables, tout en permettant d'écrire sur leur surface et d'effacer l'écriture un nombre illimité de fois. Pour le montage de ces cartes il a été réalisé des méthodes spéciales qui en rendent l'usage très commode en vol. De plus, la maison Stanford a mis au point une autre méthode particulière de montage pour les avions légers à bord desquels l'étui contenant la carte doit se loger dans un casier ménagé au-dessus du tableau.

Les appareils photographiques automatiques "Eagle," adoptés par les sociétés de travaux aériens de topographie, ainsi que par les autorités navales et militaires dans le monde entier, sont susceptibles de s'actionner soit manuellement, soit grâce à des dispositifs semi-automatiques ou entièrement automatiques, à commande électrique. Cette maison construit également deux types normaux de supports pour photographie verticale et oblique. L'appareil photo-revolver Williamson pour avions constitue un modèle très approprié à l'usage des aviateurs particuliers, et ce petit instrument a permis de faire d'excellents travaux. La maison Williamson construit enfin de nombreux autres genres d'appareils à main et à pied, de même qu'une série très complète d'accessoires divers pour chambres noires.

EDWARD STANFORD, LTD.

12, Long Acre, London, W.C.2.

STANFORD flying maps are treated with the "Lutra" process, which renders them waterproof and durable, but at the same time allows the surface to be written on and wiped clean an indefinite number of times. Special methods of mounting these maps have been evolved which makes them very handy for use in the air. A further particular method is also used for light aircraft where the case containing the maps is designed to fit into the recess over the dashboard.

WILLIAMSON MANFG. CO., LTD.,

Willesden Green, London, N.W.10.

"EAGLE" automatic cameras as used by the Air Survey Companies and naval and military authorities throughout the world are supplied for hand operation, semi-automatic or fully automatic with electrical control. Two standard types of mountings are made for vertical and oblique photography. The Williamson pistol aircraft camera is a very suitable type for private owners, and much good work has been done with this small instrument. Many other types of hand-held and ground cameras are made as well as a comprehensive range of dark room equipment.

A los mapas de aviación "Stanford" se les aplica el procedimiento "Lutra," el cual aumenta su duración y les da absoluta resistencia al agua, pero al mismo tiempo permite escribir en la superficie, y limpiar ésta, un número indefinido de veces. Se ha conseguido producir métodos especiales para montar estos mapas, los cuales facilitan grandemente su uso en el aire. Para los aeroplanos pequeños se emplea, además, un método especial, mediante el cual la caja que contiene los mapas está diseñada para que ajuste en el hueco que hay sobre el tablero.

Las cámaras fotográficas automáticas "Eagle" las usan todas las empresas que se dedican a trabajos aéreos de topografía, y se suministran también a las autoridades navales y militares de todo el mundo para funcionamiento a mano, semiautomático o automático completamente, como dispositivo eléctrico de gobierno. Fabrica también esta compañía dos tipos de montaje para fotografía vertical u oblicua. La cámara foto-revolver "Williamson" es un tipo muy adecuado para aviadadores particulares, habiéndose hecho trabajos de gran eficiencia con este pequeño instrumento. Se construyen también otros muchos tipos de cámaras fotográficas de mano o de trípode, a la vez que un extenso surtido de equipos para cámaras oscuras.

INSTRUMENTS AND WIRELESS

INSTRUMENTS ET T.S.F.

S. G. Brown vient d'élaborer plusieurs importants et intéressants instruments pour avions. Au premier rang peuvent être mentionnés son Indicateur de virage et son Indicateur de tangage et de lacet. Le premier se fournit en deux modèles, l'un à commande anémodynamique et l'autre à commande électrique. Les deux modèles sont exceptionnellement légers : ils ne pèsent que 650 grammes. Une notable caractéristique du modèle électrique, c'est qu'il est absolument sans effet de quelque nature que ce soit sur le compas. Les deux modèles, qui peuvent être mis en marche ou arrêtés du poste de pilotage, sont pourvus d'un régulateur de sensibilité permettant de les adapter à tous appareils et à toutes conditions atmosphériques et de les rendre aussi sensibles que le désire le pilote. Les deux modèles ont leur cadran lumineux, et le modèle électrique, éclairé intérieurement, présente des fenêtres rouges ou vertes suivant la direction du virage. Les deux modèles sont aussi munis d'un inclinomètre, de petites dimensions mais absolument sûr, placé au bas du cadran.

S. G. BROWN, LTD.,

North Acton, London, W.3.

S. G. BROWN have recently evolved several important and interesting instruments for aircraft use. Chief amongst these may be mentioned their Turn Indicator and Pitch and Yaw Indicator. The former is supplied in two models, the wind-driven and electrically driven. Both models are exceptionally light, and weigh only 1 lb. 7 oz. A notable point about the electrical model is that it has absolutely no effect upon the compass in any way whatsoever. Both models may be turned off or on from the cockpit and are fitted with a sensitivity control allowing the instrument to be adapted to any machine or weather condition, and made as sensitive as the pilot desires. Both models have luminised dials, and the electric model is internally illuminated, thereby showing red and green windows, according to the direction in which the turn is being made. Both models are also fitted with a small but absolutely reliable inclinometer at the bottom of the dial.

KELVIN BOTTOMLEY & BAIRD, LTD.,

Cambridge Street, Glasgow.

SINCE the early days of flying, compasses have been supplied by this firm for use in aircraft. All types are now made comprising a range from which compasses suitable for any type of aircraft may be chosen. It is claimed that

INSTRUMENTOS Y T.S.H.

La casa S. G. Brown ha producido recientemente varios instrumentos importantes y de gran interés para la aviación. Entre los más notables pueden mencionarse su indicador de viraje y su indicador de inclinación y desvío. El primero se suministra en dos modelos, el impulsado por el viento y el impulsado por energía eléctrica. Ambos son excepcionalmente ligeros, pues solamente pesan 650 grs. Un punto que merece citarse sobre el modelo eléctrico es el de que no tiene absolutamente el menor efecto sobre la brújula en ninguna forma. Cada uno de estos modelos puede cerrarse o abrirse desde el puesto del piloto, y están provistos de un mecanismo de gobierno sensitivo que permite adaptar el instrumento a cualquier máquina o a cualesquiera condiciones que desee el piloto. Ambos modelos tienen esferas iluminadas, y el eléctrico puede iluminarse interiormente, mostrando así ventanas rojas y verdes según la dirección en que se haga el viraje. Los dos modelos tienen un pequeño inclinómetro, que es completamente seguro, en la parte inferior de la esfera.

C'est depuis les premiers débuts de l'aviation que les compas fournis par cette maison s'emploient pour l'agencement des avions. Ses fabrications comprennent actuellement tous les types connus, de sorte qu'on peut y trouver des modèles appropriés aux besoins de n'importe quel type d'appareil. Il est revendiqué que le système mobile de ces

Desde los primeros tiempos de la aviación esta casa se ha dedicado a la construcción de compases para el equipo de aviones. La fabricación comprende actualmente todos los tipos conocidos, de manera que pueden proveerse modelos apropiados para cualquier tipo de aparato. Se asegura que el sistema movable de estos compases es de un peso

compas est d'un poids tellement léger qu'il n'exige aucun dispositif amortisseur et supprime toute friction au pivot. De plus, après déflexion, le retour à la position de repos s'effectue avec le minimum d'oscillation. Parmi les autres instruments que peut fournir la maison K.B.B., on cite : feux latéraux pour avions, compas-bracelets et compas d'atterrissage, ainsi que vibromètres facilitant l'étude des problèmes que pose la vibration dans les moteurs d'un régime très élevé.

the moving system of these compasses is so light in weight as to render damping unnecessary and pivot friction non-existent. Furthermore, when deflected, it will return to a position of rest with a minimum of oversway. Other instruments supplied by K.B.B. are aircraft Sidelights, Wrist and landing Compasses and Vibrometers for investigating vibration problems in high-speed engines.

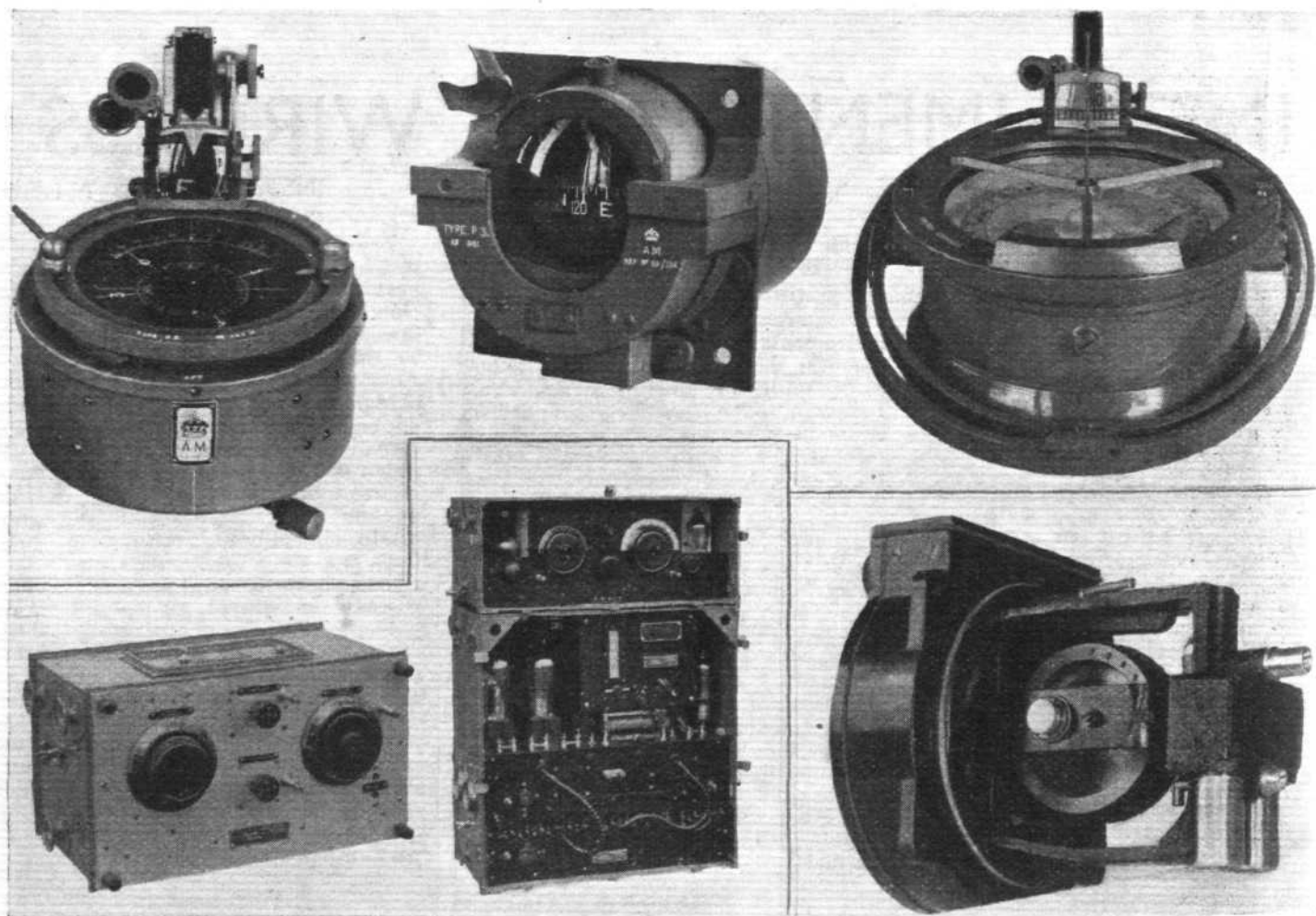
tan liviano que no requiere un dispositivo amortizador y suprime la fricción del pivote. Además, después de la deflexión, vuelve a su posición de reposo con un mínimo de oscilación. Otros instrumentos provistos por la firma K.B.B. y que pueden ser citados, son faroles laterales para aviones, compas-pulsera y compas de aterrizaje así como también vibrómetros para el estudio de los problemas que suscitan las vibraciones en los motores sometidos a un régimen muy elevado.

"Equipped de T.S.F." pour avions est presque synonyme du nom de "Marconi," et la maison a établi toute une gamme de postes spéciaux. L'espace dont nous disposons ne permet pas l'énumération de tous les postes que cette maison est à même d'offrir, mais les usagers éventuels peuvent être assurés qu'il en existe un qui répond parfaitement à leurs exigences. On s'est particulièrement appliqué, dans tous les modèles, à éliminer tous bruits extérieurs, ce résultat ayant été réalisé par des moyens électriques et mécaniques, par des microphones et des casques ingénieusement conçus, également par un système de blindage destiné à éliminer les perturbations provenant de l'allumage des moteurs.

MARCONI CO., LTD.,
Strand, London, W.C.2.

WIRELESS equipment for aircraft is almost synonymous with the name of Marconi, and a series of special sets have been designed by this firm. Space does not allow enumeration of all the sets available, but prospective users can rest assured that there is one which will meet their desire. Particular attention has been paid in all models to eliminate all outside noises, and this has been attained by electrical and mechanical means, ingeniously designed microphones and helmets, also a system of screening for elimination of disturbances from the ignition system of the engines.

Puede decirse que el equipo de telegrafía sin hilos para aeroplanos es sinónimo con el nombre de Marconi. Esta Compañía ha diseñado una serie de instalaciones especiales. El espacio disponible no permite enumerar todas las instalaciones existentes, pero aquellos que se propongan usarlas pueden estar seguros de que encontrarán alguna de acuerdo con sus deseos. En todos los modelos se ha dedicado atención especial a la eliminación del ruido, lo cual se ha conseguido con la aplicación de instrumentos eléctricos o mecánicos, con micrófonos o cascos diseñados ingeniosamente, y también mediante un sistema de resguardos para la eliminación de disturbios procedentes del sistema de ignición de los motores.



Top : A range of Hughes' Compasses marketed by Smiths Aircraft Instruments. Bottom, left : two typical Marconi wireless outfits. Right : The Brown air-driven Turn Indicator.
Haut : Série de compas Hughes mis en vente par Smiths Aircraft Instruments. Bas gauche : deux équipements Marconi typiques de T.S.F. Droite : Indicateur anémométrique de virage Brown.
Arriba : Serie de compases Hughes vendidos por Smiths Aircraft Instruments. Abajo, izq. : dos equipos Marconi típicos de T.S.H. Derecha : Indicador anemométrico de viraje Brown

Smiths se fait une spécialité de l'étude et de la construction de tous types d'instruments pour avions et possède le droit exclusif d'exporter les bougies d'allumage K.L.G., ainsi que les compas aperiódiques et instruments de navigation "Husun." Il a établi une plaque de portée pour anémomètre périscopique, destinée à s'utiliser sur avions totalement enfermés, hydravions monocoques et dirigeables. Il existe plusieurs modèles du compas "Husun," qui ont été employés par tous les aviateurs les plus renommés. L'anémoscope Armour est un petit instrument compact, constitué par un mécanisme contenant des cylindres en verre qu'on peut libérer en cas de nécessité et qui, en se brisant, dégagent un dense nuage de fumée destiné à indiquer la direction et la force du vent. Cet appareil a été mis au point par l'officier d'aviation J. D. Armour. Il y a lieu de noter que le contenu des cylindres est complètement antiincendiaire.

SMITHS AIRCRAFT INSTRUMENTS,

185, Great Portland St., London, W.1
SMITHS are specialists in the design and manufacture of all types of aircraft instruments, and sole export distributors of K.L.G. sparking plugs and "Husun" Aperiodic compasses and navigation instruments. A Periscopic Wind Gauge Bearing Plate has been designed which is intended for use on totally enclosed aircraft, flying boats, or airships. Several models of the "Husun" compass are available, and have been used by all the well-known airmen. The Armour wind direction indicator is a compact little instrument consisting of a mechanism holding glass cylinders which are released when necessary, and on breaking emit a dense cloud of smoke indicating the direction and strength of the wind when required. This has been developed by F./O. J. D. Armour. It is worth note that the contents of the cylinders are completely non-incendiary.

La casa Smith se dedica especialmente al diseño y la manufactura de todos los tipos de instrumentos de aviación, y es la única que exporta las bujías de encendido "K.L.G." y las brújulas aperiódicas e instrumentos de navegación "Husun." Se ha diseñado una placa de apoyo para anémómetros periscópicos para aeroplanos enteramente encerrados, aviones marinos y aeronaves. Hay disponibles varios modelos de brújulas "Husun," las cuales han sido usadas por todos los aviadores más prominentes. El anémoscopio "Armour" es un pequeño instrumento compacto, compuesto de un mecanismo que contiene cilindros de cristal que se sueltan cuando es necesario, y al romperse emiten una densa humareda que indica, cuando se requiere, la dirección y fuerza del viento. Este instrumento se ha desarrollado por el Oficial de Aviación J. D. Armour. Debe mencionarse que el contenido de los cilindros es completamente ininflamable.

INSURANCE

ASSURANCES

Les maisons de courtage qui se consacrent spécialement aux opérations d'assurances intéressant l'aviation ne sont certes pas nombreuses. MM. Bray, Gibb & Co. s'occupent de ce genre d'affaires depuis les premiers débuts, et il est probable que ce sont eux qui ont pour ainsi dire créé l'assurance pour l'aviation dans notre pays. Il est intéressant de noter que parmi leurs premiers clients ont compté des personnalités aussi célèbres que le Colonel Cody et Gustave Hamel.

BRAY, GIBB & CO., LTD.,
166, Piccadilly, London, W.1.

INSURANCE Brokers who specialise in aircraft insurance are not very many. Bray, Gibb & Co., have been connected with this type of business since the earliest days, and were probably the pioneers of aviation insurance in this country. It is interesting to note that their early dealings were with such men as Colonel Cody and Gustav Hamel.

SEGUROS

Los corredores que se dedican especialmente a las operaciones de seguros relacionadas con la aviación no son muy numerosos. Los Señores Bray, Gibb & Co., se han dedicado a este ramo de seguros desde la iniciación de la aviación y podríamos decir que es probable que esta casa fuese la que creó en nuestro país el ramo de seguros aeronáuticos. Es bastante interesante anotar este hecho que entre sus primeros clientes se encontraron personalidades tan notables como el Coronel Cody y Gustav Hamel.

BRITISH AVIATION INSURANCE GROUP,

78, Cornhill, London, E.C.3.

SECURITY with satisfaction for owners, operators and passengers in civil aviation are the exclusive interests of this group. Formed as a pool of some of the leading companies, and under the able management of Capt. A. G. Lamplugh, the group has grown enormously during recent years, and now has branches abroad. Nothing has been too large or too small for them to take on, and it is very largely due to their sympathetic assistance that many of the flying clubs and such-like institutions have been able to carry on. Capt. Lamplugh and his staff are themselves pilots, and all aviation matters receive his personal attention.

■ S'efforcer d'assurer sécurité et satisfaction à sa clientèle recrutée parmi les aviateurs particuliers, le personnel de l'aviation civile et les passagers, tel est le souci exclusif de ce groupe. Constitué afin de réunir certaines des grandes Compagnies d'Assurances, sous la capable direction du Capitaine A. G. Lamplugh, ce groupe a fait d'énormes progrès au cours de ces dernières années, et possède actuellement des succursales à l'étranger. Il n'est point d'affaire qui soit trop importante ou trop petite pour que ce groupe ne puisse s'y intéresser, et c'est d'ailleurs dans une large mesure que, grâce à son concours plein de sympathie, de nombreux aéro-clubs et organismes analogues ont eu la possibilité de continuer. Le Capitaine Lamplugh ainsi que ses collaborateurs sont tous pilotes-aviateurs, et toutes les questions se rapportant à l'aviation sont l'objet de son attention personnelle.

Faciliter el máximo de seguridad y satisfacción a su clientela que incluye los aviadores particulares, el personal de la aviación civil y los pasajeros, tal es el objeto exclusivo de este grupo. Constituido a fin de reunir ciertas de las grandes Compañías de Seguros bajo la eficiente dirección del Capitán A. G. Lamplugh, este grupo ha progresado de manera notable durante los últimos años y actualmente posee sucursales en el extranjero. Nada en esta clase de negocios es demasiado grande o pequeño para interesar a este grupo y es gracias a su actitud benévola y simpática que muchos de los aéroclubs e instituciones análogas han podido continuar su actividad en este país. El Capitán Lamplugh, así como también sus colaboradores, son pilotos aviadores y todos los asuntos que se refieren a la aviación son objeto de su atención personal.

Spécialistes de l'assurance appliquée aux planeurs, cette maison est l'une des premières qui se soient occupées d'établir un plan complet offrant vraiment le genre d'assurance dont ont besoin les amateurs du vol à voile. Elle a créé quatre polices principales, à savoir : police complète ; perte totale seule ; perte totale avec risques au sol et de transport ; enfin, risques au sol et de transport seuls. Les primes sont fort raisonnables dans chaque cas, et les garanties offertes sont des plus sérieuses.

MAXTON GRAHAM & CO.,

Bush House, London, W.C.2.
SPECIALISTS in insurance for Gliders. This is one of the first firms to issue a comprehensive scheme covering the class of insurance required by those operating Gliders. Four main policies are issued, the Comprehensive ; the total loss only ; the total loss, ground and transit risks ; and ground and transit risks only. The premiums are very reasonable in each case and the security offered ample.

Especialistas en seguros aplicados a los planeadores. Esta es una de las primeras casas que se han ocupado del establecimiento de un plan completo que incluye la clase de seguro necesario a cuantos usan planeadores para sus vuelos. Existen cuatro pólizas principales, a saber : póliza completa, pérdida total solamente, pérdida total con riesgos en el suelo o durante el tránsito y, por último, riesgos en el suelo o de tránsito solamente. Las primas son muy razonables en cada caso, y las garantías que se ofrecen son muy amplias.

METAL SUPPLIERS

MÉTAUX, FOURNISSEURS DE

Comptant au nombre des plus anciennes fabriques de tubes de notre pays, la maison Accles & Pollock n'a pas à attendre qu'on la présente aux industries de l'aviation. Depuis ces dernières années, elle s'est fait une spécialité de la manipulation des tubes, en leur donnant les formes les plus variées, parmi lesquelles on peut citer : tubes coudés, de section décroissante, à calibrage conique, en serpentín, à brides, aboutés, amincis, dilatés et soudés. Tous ces produits sont disponibles selon profils en tous genres, et de nombreuses pièces d'avions montées sur gabarit construites à l'aide de tubes se fournissent en provenance directe de ces usines.

Usine pouvant fournir des aciers conformes à toutes les spécifications du Ministère de l'Air de Grande Bretagne, ainsi qu'à celles de la B.E.S.A., à l'intention de la construction des avions et des moteurs d'aviation. Il convient de citer tout particulièrement, ses aciers au nickel chrome et aciers inoxydables de qualité absolument supérieure.

Fournisseurs d'aluminium et d'alliages d'aluminium sous toutes les formes, telles que : tôles et tubes en aluminium ; tôles, tiges, barres et tubes en alliage d'aluminium, de formes circulaires, carrées ou irrégulières. Cette maison peut également livrer des pièces venues de forge, y compris carter de moteur et hélices.

C'est cette maison qui introduisit le duralumin sur le marché anglais, et, à l'heure actuelle, elle fournit non seulement ce métal, mais également l'alliage "Y," le laiton et le cuivre rouge sous toutes leurs formes. Le duralumin en feuilles se livre soit recuit, soit laminé à l'état dur, jusqu'aux dimensions de 3 m. x 1 m. 20. De même les tubes étirés sans couture, tubes de formes diverses, barres et profils refoulés à la presse, profilés en U à ailes, pièces forgées au martinet, etc., peuvent s'obtenir en alliage "Y" ou en duralumin, tandis qu'en ce qui concerne le cuivre et le laiton, la maison fournit ces métaux sous forme de tubes, tôles, différentes pièces détachées, etc.

ACCLES & POLLOCK, LTD.,

Oldbury, Birmingham.
AS one of the oldest tubing manufacturers in this country Accles & Pollock need no introduction to the aircraft trade. Of late years they have specialised in tubing manipulation and among the forms they can supply are bent, tapered, taper gauged, coiled, flanged, butted, reduced, expanded and welded. All kinds of special sections are available, and many jig built aircraft parts constructed of tubes are supplied direct from these works.

AIRCRAFT MATERIALS, LTD.,

Midland Road, London, N.W.1.
STEELS conforming to all the Air Ministry and B.E.S.A. specifications for use in aircraft and aircraft engine construction are supplied from these works. A particular line is the higher grade nickel chrome and stainless steels.

ALUMINIUM (11), LTD.,

Aldwych, London.
SUPPLIERS of all forms of aluminium alloys such as aluminium sheeting and tubing, alloy sheeting rod, bar and tubing in round, square and irregular shapes. Forgings can also be supplied if required, these include crankcases and airscrews.

JAMES BOOTH & CO., LTD.,

Nechells, Birmingham.
DURALUMIN first came on the English market through this firm, which now supplies not only Duralumin, but "Y" alloy, brass and copper in all forms. Duralumin sheets are supplied annealed or hard rolled, up to 10 ft. by 4 ft., and also solid-drawn tubes, shaped tubes, extruded bars and sections, flanged channels, drop forgings, etc., can be obtained in both "Y" alloy and Duralumin, and in copper and brass, tubes, sheets and parts, etc., are supplied

METALES, PROVEEDORES DE

Contándose entre las más antiguas de cuantas se dedican en la Gran Bretaña a la fabricación de tubos, la casa Accles & Pollock no necesita ser presentada a la industria de la aviación. En los últimos años se ha dedicado especialmente a la manipulación de tubos, y entre las formas que suministra pueden citarse las siguientes : tubos acodados, de sección decreciente, de calibración cónica, en espiral, con bridas, empalmados, adelgazados, dilatados y de soldadura. Hay disponibles perfiles especiales de todas clases, y se proveen directamente de la fábrica numerosas piezas de aviones montadas sobre plantillas de guía y construidas con la ayuda de tubos.

Esta fábrica suministra aceros que se ajustan a todas las especificaciones del Ministerio de Aviación de la Gran Bretaña y a las de la B.E.S.A., para su empleo en la manufactura de aviones y motores de aviación. Entre los productos de esta casa merecen citarse especialmente sus aceros al níquel cromo y sus aceros inoxidables de calidades absolutamente superiores.

Proveedores de aluminio y de aleaciones de aluminio de todas clases, tales como chapas y tubos de aluminio ; chapas, varillas, barras y tubos de aleación de aluminio, en formas circulares, cuadradas e irregulares. Esta casa puede suministrar también piezas procedentes de forjas, incluyendo cajas de motores y hélices para aviones.

Esta compañía fué la primera que lanzó al mercado en Inglaterra el duraluminio, y ahora suministra no solamente este producto sino también la aleación "Y," latón y cobre de todas descripciones. Las chapas de duraluminio se suministran recocidas o laminadas en el estado duro, hasta el tamaño de 3 m. x 1,20 m. Pueden obtenerse tubos estirados sin costura, tubos de varias formas, barras y secciones estrujadas con la prensa, perfiles U con alas, piezas forjadas al martinete, etc., tanto de la aleación "Y" como de duraluminio, mientras que en lo que se refiere al cobre y al latón, se pueden conseguir estos metales en forma de tubos, chapas y también piezas sueltas de todas clases.

Fournisseurs d'alliages à base d'aluminium et de silicium à l'aluminium, en lingots, en feuilles, en baguettes, également tréfilés, en poudre, ou encore sous forme de rivets.

Fabrication d'un alliage extra-léger à base de magnésium, également de moulages au sable et à la matrice, de pièces estampées, forgées et refoulées à la presse, pour la construction des avions. L'emploi de cet alliage, qui permet de réaliser une économie de poids d'environ 40 pour cent en comparaison des alliages à base d'aluminium, est actuellement en train de se propager de plus en plus parmi la majorité des constructeurs de moteurs et d'appareils d'aviation.

Tubes en cuivre rouge, baguettes en bronze phosphoreux étiré, laiton et cuivre rouge en feuilles, baguettes rondes en laiton, barres moulées en bronze rouge et en bronze phosphoreux, tels sont les genres de produits métalliques que cette maison fabrique à l'intention des constructeurs d'aéroplanes. Ainsi qu'il va sans dire, toutes ces fabrications répondent parfaitement aux exigences des spécifications voulues.

Moulages en aluminium de tous genres pour constructions aéronautiques, fabriqués aussi bien à la matrice que par la méthode des moules au sable. Cette maison traite des affaires considérables pour les carters, pistons, et moulages divers destinés aux carburateurs, clinomètres, baromètres, instruments de T.S.F. et autres. Elle a mis au point sous le nom de "Coanailium" un alliage spécial possédant une excellente résistance à la traction de même qu'un coefficient élevé d'allongement, et qui résiste d'une façon exceptionnelle aux propriétés corrodantes de l'eau de mer.

Spécialiste de la fabrication de tous aciers spéciaux pour la construction des appareils d'aviation, cette maison est en mesure de fournir une très grande diversité d'aciers susceptibles de résister à l'oxydation, et le grand essor qu'est en train de prendre l'industrie dans la voie des grands avions monocoques et des hydravions, ne saurait manquer d'ouvrir de plus en plus de débouchés aux produits de cette nature.

Aciers tréfilés de même qu'en feuillard ou ruban, aussi bien sous forme de matière première que de pièces parachevées, tels sont les produits de cette Compagnie. Parmi ses fabrications, on peut citer plus spécialement:—fil d'acier inoxydable pour rivets, fil demi-rond pour goupilles fendues, fil spécial pour ressorts de soupapes employés dans l'aviation, tirants, fil à souder, ainsi qu'une grande diversité de pièces forgées et usinées établies à l'aide d'aciers conformes aux spécifications en vigueur pour la construction des appareils d'aviation.

BRITISH ALUMINIUM CO., LTD.,
King William Street, London, E.C.4.
SUPPLIERS of aluminium and aluminium silicon alloys in ingots, sheets, rods and wire, also as powder and in the form of rivets.

BRITISH MAXIUM, LTD.,

Wandsworth, London, S.W.18.
ARE producers of ultra-light magnesium alloy, sand castings, die-castings, stampings, forgings, and extrusions for aircraft work. This material effects a saving in weight of some 40 per cent. over aluminium alloys, and is now rapidly coming into more common use by the majority of aero-engine and aircraft manufacturers.

C. CLIFFORD & SON, LTD.,
Birmingham.

COPPER tubes, drawn phosphor-bronze rods, brass and copper sheets, round brass rods, cast gun-metal bars, cast phosphor-bronze bars, are the type of metal supplies for aircraft produced by this firm, all of which are, of course, to the requisite specifications.

R. W. COAN, LTD.,

Islington, London, N.1.
CASTINGS in aluminium for aeronautical work of every description, both die-cast and sand-moulded. This firm does a large trade in crankcases, pistons, and castings for carburettors, clinometers, barometers, wireless and other instruments. A special alloy called "Coanailium" has been evolved, with a very good tensile strength, a high percentage of elongation, and which withstands the corrosive properties of sea-water exceptionally well.

T. FIRTH & SONS, LTD.,

Northwick Works, Sheffield.
SPECIALISTS in alloy steels for aircraft works. A very wide range of rust and corrosion-resisting steels are supplied by this firm, and with the great increase in flying-boat and seaplane construction, this form of steel is finding a growing demand.

S. FOX & CO., LTD.,

Stockbridge Works, Sheffield.
WIRE and strip steel, both as raw material or as finished parts, are the produce of this Company. Among these products are stainless steel rivet wire, half round split pin wire, special aero valve spring wire, tie-rods, welding wire and a variety of forged and machine parts from steels of aircraft specifications.

Proveedores de aleaciones a base de aluminio y de silicio de aluminio, en lingotes, chapas, varillas y alambre, como también en polvo y en forma de remaches.

Esta casa produce una aleación excepcionalmente ligera de magnesio, así como también fundiciones en arena, fundiciones matizadas, piezas estampadas, piezas forjadas y piezas expulsadas con la prensa para la manufactura de aviones. Mediante el empleo de este material se reduce el peso de las piezas en un 40 por cent. aproximadamente, en comparación con las aleaciones de aluminio. Se va extendiendo rápidamente su uso entre la mayoría de los fabricantes de aeroplanos y motores de aviación.

Tubos de cobre rojo, varillas de bronce fosforoso estiradas, chapas de latón y cobre rojo, varillas redondas de latón, barras moldeadas de bronce de cañón, barras moldeadas de bronce fosforoso, tales son los productos metálicos que esta casa fabrica para los constructores de aeroplanos. Todas sus manufacturas se ajustan, por supuesto, a las especificaciones de los compradores.

Piezas de aluminio para trabajos de construcciones aeronáuticas de todas descripciones, tanto matizadas como fundidas en moldes de arena. Esta casa surte grandes cantidades de cárters para motores, émbolos y piezas de fundición para carburadores, clinómetros, barómetros, aparatos de telegrafía sin hilos y de otras clases. Produce una aleación especial denominada "COANAILIUM" con gran resistencia a la tracción y un coeficiente muy elevado de estiramiento, la cual ofrece una resistencia excepcional a las propiedades corrosivas del agua del mar.

Esta casa es especialista en la construcción de aceros especiales para la construcción de aparatos de aviación. Suministra un surtido muy extenso de aceros resistentes a la oxidación, y debido al continuo aumento en la construcción de hidroplanos y aviones marinos, la demanda de estas clases de acero crece de día en día.

Fabrica esta empresa alambre y flejes de acero, ya sea en forma de materia prima o de producto acabado. Entre sus manufacturas se cuentan las siguientes: alambre de acero inoxidable para remaches, alambre semi-redondo para pasadores hendidos, alambre especial para los resortes de válvulas usados en la aviación, tirantes, alambre para soldaduras, y un gran surtido de piezas forjadas y fabricadas de aceros conformes a todas las especificaciones en vigor, para la construcción de aeroplanos.

Les produits de cette maison comprennent paliers entièrement terminés pour têtes de bielle et vilebrequins. Mais pour ceux des constructeurs qui préfèrent effectuer eux-mêmes la garniture de leurs paliers, la maison est également en mesure de leur fournir le Findlay's Motor Metal L.1, alliage spécial pour paliers utilisé désormais par la majeure partie des fabricants de moteurs à explosion, aussi bien en Grande Bretagne qu'en France.

Voici plus d'un siècle que la maison Habershon s'occupe de fournir l'acier laminé à froid. Depuis ces dernières années, elle s'est mise aussi à pourvoir aux besoins de l'industrie de l'aviation, et livre ses feuillards et rubans d'acier à la majorité des constructeurs d'aéroplanes.

L'alliage Hoyt No. 11, métal anti-friction servant à garnir les paliers, est tellement connu et d'un usage si répandu qu'il n'exige guère que nous en fassions ici la description. Le métal Hoyt s'est employé à un moment ou à un autre à la construction de la plupart des moteurs d'aviation de marque connue, et—à vrai dire—des moteurs de tous types, et la performance de ces moteurs constitue certes par elle-même une recommandation suffisante.

L'acier spécial K.E. 965 pour soupapes, qui offre une grande résistance à la chaleur, a été étudié tout spécialement en vue de son emploi dans les moteurs à explosion. Actuellement d'un usage très répandu parmi les grands constructeurs de moteurs d'aviation, il est revendiqué en sa faveur de nombreux avantages, parmi lesquels on peut citer les suivants : cet acier se forge et s'usine dans d'excellentes conditions, conserve aux températures élevées un haut coefficient de résistance à la traction, ne durcit pas—de sorte qu'il ne devient pas cassant, et résiste, à un degré remarquable, à la corrosion qu'il produit habituellement les gaz d'échappement.

Moulages en tous genres pour avions, et plus particulièrement les moulages en aluminium pour moteurs d'aviation, tels sont les produits que fabrique les usines William Mills. L'expérience que cette maison possède dans cette branche spéciale remonte déjà à bien des années, et quoique les moulages pour moteurs d'aviation constituent souvent des pièces fort compliquées, ces usines affirment qu'elles sont en mesure de répondre aux exigences les plus sévères de l'industrie.

Les usines Reynolds se chargent de la fourniture aux constructeurs de l'aviation de tubes de pour ainsi dire toutes les formes possibles et imaginables : tubes de diverses longueurs, rectilignes ou coudés, bombés, amincis, de section décroissante, soudés, à brides. Cette maison est à même de fournir n'importe quel profil voulu, tout aussi bien que les tubes de section circulaire, et nombreux parmi sa clientèle sont les constructeurs qui se font livrer des profils spéciaux, en longueurs appropriées à la construction de leurs propres longerons d'aile.

GLACIER METAL CO., LTD.,

Alpert, Wembley.

PRODUCE supplied by this firm includes completely-finished connecting-rod big-end and main crankshaft bearings. For those manufacturers who wish to line their own bearings, Findlay's Motor Metal L.1 is also supplied. This bearing alloy is now used by the majority of internal-combustion engine builders in Great Britain, as well as in France.

J. J. HABERSHON & SONS, LTD.,

Rotherham, Yorkshire.

COLD-ROLLED steel has been supplied by Habershon for over a hundred years. Of late years they have turned their attention to the aircraft trade, and steel strip is now supplied to the majority of aircraft manufacturers.

HOYT METAL CO., LTD.,

Deodar Road, London, S.W.15.

HOYT No. 11 alloy is a non-friction metal for lining bearings which is so well known, and so widely used as to require little description from us. Most of the well-known aircraft engines, and indeed all types of engines, have at one time used Hoyt metal, and their performances alone are sufficient recommendation for it.

KAYSER ELLISON & CO., LTD.

Sheffield.

K.E. 965 is a special heat-resisting valve steel developed for use in internal-combustion engines. It is now used by many of the well-known aircraft engine manufacturers, and has many advantages claimed for it, amongst which may be mentioned the fact that it forges and machines well and retains a high tensile value at high temperatures ; it will not harden, and therefore does not become brittle, and resists erosion by the exhaust gases, to a remarkable degree.

W. MILLS, LTD.,

Grove Street, Birmingham.

ALL types of aircraft castings and particularly those for aircraft engines in aluminium are made at the works of William Mills. Their experience in this class of work dates back over a very long period, and although many aircraft engine castings are complicated, it is their boast that they can meet the most exacting requirements of the industry.

REYNOLDS TUBING CO.,

Tyseley, Birmingham.

TUBING, in almost every conceivable form, both in straight lengths and also bent, bulged, reduced, tapered, welded and flanged, is delivered to aircraft works from the Reynolds' factory. Every form of section can be supplied, as well as round tube, and many firms are having their own special sections delivered in lengths suitable for making their wing spars.

Los productos de esta casa comprenden cojinetes enteramente acabados para cabezas de bielas y árboles cigüeñales. Para aquellos fabricantes que deseen efectuar por sí mismos el revestimiento de sus cojinetes, se suministra el Findlay's Motor Metal L.1, aleación especial para cojinetes que actualmente usan la mayor parte de los fabricantes de motores de combustión en la Gran Bretaña y en Francia.

Hace más de un siglo que la casa Habershon viene suministrando acero laminado en frío. Desde hace algunos años se dedica a proveer las necesidades de la industria de la aviación, y actualmente surte sus tiras de acero a la mayoría de los fabricantes de máquinas voladoras.

La aleación Hoyt No. 11, metal de antifricción para revestir cojinetes, es tan conocida y tan extensamente usada que apenas requiere la menor descripción por nuestra parte. El metal Hoyt se emplea en la construcción de casi todos los motores de aviación y, en realidad, de los motores de todos los tipos. Su performance por sí sola constituye una recomendación suficiente.

El acero especial K.E. 965 para válvulas, que ofrece gran resistencia al calor, ha sido estudiado para su empleo en motores de explosión. Actualmente lo usan muchos de los más reputados fabricantes de motores para la aviación. Se afirma que tiene muchas ventajas, entre las cuales debe citarse la de que se forja y trabaja con suma facilidad, a la vez que conserva una gran resistencia a la tracción a temperaturas muy elevadas. No se endurece y, por lo tanto, no se hace quebradizo, resistiendo en grado sumo la erosión que producen los gases de escape.

La casa William Mills fabrica fundiciones para aviones de todos los tipos, especialmente fundiciones de aluminio para motores de aviación. Su experiencia en esta clase de trabajo data de tiempos remotos, y aunque muchos de las fundiciones para motores de aviación son por demás complicadas, afirma esta empresa que puede dar cumplimiento a las necesidades más exigentes de la industria.

La fábrica Reynolds surte a los talleres de aviación tubos de casi todas las formas imaginables : tubos de diversas longitudes rectilíneos y acodados, bombados, adelgazados, de sección decreciente, soldados y con bridas. Esta casa suministra la forma de perfil que se requiera, del mismo modo que los tubos de sección circular, y son muchos los fabricantes a quienes surten de perfiles especiales, en longitudes adecuadas para la construcción de sus propios largueros de ala.

OPERATING COMPANIES

COMPAGNIES DE NAVIGATION AÉRIENNE

COMPAÑÍAS DE NAVEGACIÓN AÉREA

C'est en 1928 que l'A.A. a inauguré son service spécial d'aviation, destiné à prêter un concours précieux à ceux de ses membres qui sont propriétaires d'appareils d'aviation. Ce service procure aux intéressés tous les documents nécessaires aux déplacements à l'étranger, et leur fournit les cartes itinéraires A.A. spéciales, si en faveur auprès de ceux qui voyagent beaucoup par les voies aériennes. Dans le courant des neuf premiers mois de l'année 1930, il a été préparé des cartes-itinéraires A.A. qui embrassent plus de 400.000 km. de lignes aériennes. Bon nombre de ces cartes, dès à présent disponibles à la bibliothèque de l'A.A., peuvent se prêter aux intéressés. En outre un personnel spécialement mis au courant des questions d'aviation par les soins de l'A.A. a déjà rendu de grands services à la plupart des meetings d'aviation ayant eu lieu dans notre pays. Il faut encore citer l'inauguration d'un service très utile : celui des messages que l'aviateur peut laisser tomber auprès de certains postes téléphoniques de l'A.A. le long des routes, pour transmission ultérieure par téléphone.

Société constituée en 1923 et qui, vers la fin de 1929, avait déjà exécuté avec succès des contrats de topographie aérienne en Europe, en Afrique et dans l'Amérique du Sud, représentant un total de £133.000. La valeur représentée par les travaux en cours d'exécution à la fin de la même année dépassait £109.000, tandis que l'on évaluait à £215.000 les soumissions en instance. Elle a établi de vastes ateliers de dessin et laboratoires à Hendon, et compte un personnel spécialisé d'experts en topographie aérienne et arpentage à terre d'environ 150 personnes. Les travaux de topographie aérienne constituent l'une des branches les plus importantes de l'utilisation des avions dans le monde entier, étant donné que leur exécution ne saurait manquer d'ouvrir de puissants et précieux débouchés à l'avenir du pays qui en fait l'objet. C'est ainsi que, ces temps derniers, il s'est effectué de vastes relevés topographiques en Rhodesia et dans l'Amérique du Sud, travaux qui se poursuivent d'ailleurs en diverses autres régions similaires. Nombreuses encore sont les grandes villes ayant eu recours aux services de la Compagnie, pour l'établissement de la topographie exacte de la localité avant d'élaborer de nouveaux plans de développement urbain.

Cette Compagnie qui figure au rang des grandes entreprises de l'aéronautique et qui, dès les premiers jours, sut se rendre compte de l'immense importance de la topographie aérienne, a déjà exécuté de très grands travaux topographiques en Afrique et en Egypte, ainsi d'ailleurs qu'en bien d'autres parties du monde. Elle a actuellement en main une grosse entreprise de cette nature dans la région du Nil Blanc Supérieur, où le département de l'irri-

THE AUTOMOBILE ASSOCIATION,

Coventry Street, London, W.1.

THE A.A. opened an aviation department in 1928 to render assistance to its members owning aircraft. This assistance includes the provision of all documents necessary for foreign travel, and also the supply of the special A.A. maps which have found so much favour with those who travel extensively by air. During the first nine months of 1930, A.A. route maps were prepared covering over a quarter of a million miles of air routes. Many of these maps are available, on loan from the A.A. map library. A specially-trained A.A. aviation staff has also rendered invaluable assistance at most of the flying meetings in the country. Another valuable service is the institution of their air messenger service, by which messages may be dropped at certain A.A. roadside telephone boxes for transmission by telephone. The A.A. is, of course, a society run for the benefit of its members and is not a company, as such.

Fuè en el año 1928 que la A.A. inauguró su servicio especial de aviación, destinado a prestar ayuda valiosa a sus socios que son propietarios de aviones. Este servicio facilita a los interesados todos los documentos necesarios para los viajes al extranjero así como también los mapas-itinerarios especiales de la A.A., los cuales han sido muy elogiados por los que usan la vía aérea extensivamente. Durante el curso de los primeros nueve meses del año 1930 la A.A. ha preparado mapas-itinerarios que abarcan más de 400.000 kms. de líneas aéreas. Un buen número de estos mapas actualmente en la biblioteca de la A.A. pueden ser obtenidos en calidad de préstamo por los interesados. Además, un personal especialmente instruido en los asuntos de aviación por la A.A. ya ha prestado grandes servicios en las reuniones de aviación que se han celebrado en nuestro país. También se debe citar la inauguración de un servicio de mucha utilidad; este consiste en ofrecer a los aviadores la facilidad de dejar caer mensajes en ciertos puntos a lo largo de las carreteras en donde la A.A. tiene instalados puestos telefónicos para su transmisión a destino por teléfono.

THE AIRCRAFT OPERATING CO., LTD.,

8, New Sq., London, W.C.2.

THIS company was formed in 1923 and by the end of 1929 had successfully completed air survey contracts in Europe, Africa and South America to the value of £133,000. The value of the work in hand at the end of 1929 was over £109,000 and tenders under offer were valued at £215,000. Large drawing offices and laboratories are established at Hendon and the skilled staff of both air and ground survey experts numbers some 150 persons. Air survey work is one of the most important branches of aircraft operation in the world, as it opens up potential and valuable opportunities for the country being surveyed. Very large tracts of country in Rhodesia and South America have recently been surveyed and work is still going on in other similar areas. Many large cities have utilised this company to survey the city before embarking on a town-planning scheme.

Esta compañía se formó en 1923, y a fines de 1929 había terminado con éxito contratos de topografía aérea en Europa, África y la América del Sur, los cuales representan la suma de £133.000. El valor del trabajo en curso de ejecución a fines de 1929 ascendía a £109.000, mientras que las licitaciones por ella presentadas subían a £215.000. Ha establecido en Hendon oficinas de dibujo y laboratorios de gran amplitud, y su personal perito para trabajos de topografía aérea y agrimensura se eleva a 150. La topografía aérea es uno de los ramos más importantes para el empleo de los aviones en todo el mundo, pues ofrece las mayores y más valiosas oportunidades al país que es objeto de ella. En Rhodesia y la América del Sur se han efectuado recientemente reconocimientos sobre vastos territorios, y estos trabajos continúan todavía en otras regiones similares. Son muchas las ciudades que han utilizado los servicios de esta compañía para reconocer el terreno antes de decidirse a preparar sus planos de desarrollo urbano.

AIR SURVEY CO., LTD.,

3, Grosvenor Gardens, London, S.W.1.

THIS Company is one of the leading concerns which from its earliest days realised the immense potentialities of air survey work. They have completed very large contracts for air survey in Africa and Egypt, and in fact in many parts of the world. A large contract is now in operation in the Upper White Nile district where the irrigation

Es ésta una de las prominentes empresas que desde los primeros días de su existencia se dió cuenta de las inmensas posibilidades que ofrecía la topografía aérea. Ha llevado a cabo trabajos muy importantes de esta naturaleza en África y Egipto. Ahora está reconociendo extensos territorios en la región del Alto Nilo Blanco, donde el departamento de irrigación del gobierno egipcio se propone abrir un canal que lleve las aguas del Nilo Blanco al río Pibor y,

gation du Gouvernement Egyptien se propose de construire un canal destiné à amener les eaux du Nil Blanc Supérieur jusqu'au fleuve Pibor, et, de là, jusqu'au fleuve Sobat, pour éviter ainsi la zone du *Sudd* (Bahr-el-Ghazal) où il se perd tant d'eau par évaporation. La Compagnie s'est également assurée l'exécution de contrats importants aux Indes, pour l'établissement du relevé cadastral des Provinces Unies et du Bengale. Il est évident que ces travaux de topographie aérienne constituent l'un des aspects les plus rémunérateurs de l'aviation civile, de sorte qu'il est agréable de penser que les deux principales sociétés commerciales se consacrant à ce genre d'entreprises sont de nationalité anglaise. L'Air Survey Company, dont la constitution vient de se remanier dernièrement, opère désormais en étroite collaboration avec la Fairey Aviation Company, combinaison dont l'effet immédiat a été de provoquer l'adaptation d'un appareil Fairey 3 F pour travaux de topographie, type d'avion au moyen duquel sont en train de s'exécuter les importants travaux précités.

Constituée par Mr. Nigel Norman et Mr. Allen Muntz dans le but d'exploiter un aérodrome commercial à Heston, cette entreprise a été l'objet d'un succès immédiat et est actuellement en train de prendre un développement rapide. Non seulement la plupart des maisons d'aviation y sont-elles représentées et y entretiennent-elles en permanence des appareils de démonstration, mais aussi le nombre des aviateurs particuliers faisant usage de l'aérodrome va-t-il en s'accroissant chaque semaine. Cette société entreprend des travaux de réparation en tous genres, et se charge même d'aller chercher les appareils partout où ils peuvent se trouver. C'est ainsi qu'à l'occasion du Concours International de Tourisme, non moins de trois des concurrents dont les appareils avaient subi des avaries, ont eu la faculté de les faire réparer pendant la nuit qu'ils furent obligés de passer à Heston, ayant pu de cette façon continuer de participer au concours le lendemain. On trouve à Heston de vastes hangars, un grand nombre de garages individuels servant à remiser les appareils, ainsi qu'un restaurant très bien agencé et des plus confortables.

L'Organisation Imperial Airways est trop connue pour exiger ici une description détaillée. Qu'il nous suffise de rappeler que, depuis 1924, l'Imperial Airways est la seule compagnie anglaise qui s'occupe de l'exploitation de lignes aériennes régulières desservant à l'heure actuelle, non seulement l'Europe continentale, mais encore des parcours qui s'étendent en Orient jusqu'à Delhi, et, vers le Sud, jusqu'au Cap. Les itinéraires actuellement exploités, y compris le prolongement de la ligne jusqu'à Delhi, ont un développement total d'environ 10.200 kms. Entre le 1er avril 1924 et le 30 septembre 1930, les appareils de l'Imperial Airways ont effectué des parcours représentant un total de 10.541.370 kms, et transporté 163.050 passagers ainsi que 5.735 tonnes de marchandises. Il est intéressant de noter que, dans le courant du trimestre ayant pris fin au 30 septembre dernier, les courriers postaux ayant quitté l'Angleterre par

authorities of the Egyptian Government propose cutting a canal which will take the waters of the Upper White Nile through to the Pibor river and thence to the Sobat river, thereby short circuiting the *Sudd* area where so much water is lost through evaporation. In India large contracts have been secured for cadastral mapping of the United Provinces and the Bengal. Air Survey has proved itself to be one of the most paying sides of civil aviation, and it is gratifying to think that the two leading commercial air survey companies of the world are British. The Air Survey Company has recently been reconstructed and is now in close collaboration with the Fairey Aviation Company. The immediate effect of this development has been the adaptation of a Fairey 3 F for survey work, and it is with this type of machine that these large contracts are being carried out.

AIRWORK, LTD.,

Heston, Middlesex.
FORMED by Mr. Nigel Norman and Mr. Allen Muntz to operate Heston as a commercial aerodrome, this venture was an instantaneous success and is now growing rapidly. Not only are the majority of aircraft firms represented and demonstration machines permanently on the aerodrome, but the number of private owners using the aerodrome grows every week. They undertake repair work of every description and will collect machines from anywhere, for example, during the recent International Touring Competition at least three competitors who sustained damage to their machines had them repaired during the night of their enforced stay at Heston and were able to proceed with the competition the following day. Spacious hangars and a large range of lock-ups are available for machines and there is also a well-equipped and comfortable restaurant.

IMPERIAL AIRWAYS, LTD.,

Charles Street, London, S.W.1.
THE organisation of Imperial Airways is almost too well-known to need detailed description. Since 1924, Imperial Airways has been the only British company to operate regular air routes, and is now running regular services, not only to the Continent, but as far east as Delhi and as far south as Cape Town. The existing route mileage, including the extension to Delhi, is some 6,339 miles. From April 1, 1924, to September 30, 1930, the miles flown by Imperial Airways machines were 6,550,243. Passengers carried were 163,050, while the freight carried, in tons, was 5,646. It is interesting to note that some 26,507 lb. of letter air mail were carried out of England by the company during the quarter ending September 30, which is an increase of 20 per cent. over that carried in the equivalent quarter of 1929; of this, the mail to India alone totalled 7,712 lb.

desde éste, al Sobat, proveyendo así facilidades para evitar el área *Sudd*, donde tanta agua se pierde a causa de la evaporación. Esta compañía ha celebrado contratos para la preparación de mapas sobre vastas extensiones de terreno en las Provincias Unidas y de Bengala, India. La topografía aérea ha demostrado ser uno de los ramos más remunerativos de la aviación civil, siéndonos muy grato el hecho de que sean británicas las dos compañías más prominentes entre cuantas se dedican a esta labor. La Air Survey Company ha sido reconstruida recientemente, y trabaja ahora en colaboración íntima con la Fairey Aviation Company. El primer resultado de las estrechas relaciones entre estas dos empresas ha sido la adopción de un avión Fairey 3 F para la labor de topografía, con el cual se está dando cumplimiento a los contratos de este género a que antes se hace referencia.

Formada por Mr. Nigel Norman y Mr. Allen Muntz para explotar un aeródromo comercial en Heston, esta empresa consiguió un éxito inmediato y su esfera de acción ensancha rápidamente. No solo están representadas en el aeródromo la mayor parte de las casas dedicadas a la aviación, que siempre tienen aparatos de demostración sobre el terreno, sino que aumenta de día en día el número de aviadores particulares que lo usan. Se encarga esta compañía de trabajos de reparación de todas descripciones y de recoger máquinas en cualquier parte. Por ejemplo, durante el reciente Concurso Internacional de Turismo hubo por lo menos tres de los concurrentes cuyas máquinas sufrieron averías; éstas fueron reparadas durante la noche que los aviadores se vieron forzados a pasar en Heston, y se hallaron en condiciones de continuar tomando parte en el concurso al día siguiente. Hay disponibles en Heston para las máquinas hangares amplios y un gran número de garajes individuales, existiendo también un restaurant muy cómodo y bien arreglado.

La organización de la empresa Imperial Airways Limited es demasiado bien conocida para que fuese necesario hacer sobre ella una descripción detallada. Basta decir que desde el año 1924 la Imperial Airways ha sido la única compañía británica que haya puesto en operación las líneas aéreas de transporte y hoy día tiene en función servicios regulares, no solamente al continente europeo sino que también a puntos tan alejados como Delhi en el oriente y la ciudad del Cabo en el sud. El recorrido servido en la actualidad por la Imperial Airways asciende a unos 10.200 kilómetros, incluyendo la extensión de la ruta aérea a Delhi. Durante el período desde el 1º de Abril de 1924 hasta el 30 de Septiembre de 1930, el recorrido hecho por los aparatos de la Imperial Airways ascendió a 10.541.370 kilómetros. El número de pasajeros transportados fué de 163.050, mientras que el peso de los fletes transportados ascendió a 5.735 toneladas. Es de

les avions de la Compagnie ont représenté un poids total de 12.000 kgs., soit une augmentation de 20 per cent par rapport au trimestre correspondant de 1929, les plis destinés aux Indes représentant à eux seuls non moins de 3.500 kgs. En ce qui concerne le nouvel itinéraire transafricain qui doit s'inaugurer d'ici peu, la première étape du Caire à Khartoum sera desservie par des appareils "Argosy" munis de moteurs "Jaguar" à réducteur; la seconde étape, Khartoum-Kisoumou, le sera au moyen de monocoques "Calcutta" (3 moteurs "Jupiter" à réducteur), tandis que la dernière étape, Kisoumou-Cape Town, s'effectuera à l'aide d'avions "Hercules" De Havilland (3 moteurs "Jupiter").

Constituée en Avril 1929, ce n'est donc que ces temps derniers que cette Compagnie vient de terminer son premier exercice annuel. Elle administre actuellement divers aérodromes et aéro-clubs à Hanworth, Leeds, Hull, Reading, Nottingham et Blackpool, où il est mis à la disposition des membres non seulement des locaux appropriés, mais également des instructeurs, sans compter le gros avantage de pouvoir fréquenter à volonté ces différents clubs réciproquement affiliés.

Les progrès réalisés à Hanworth sont vraiment phénoménaux, car cet aéro-club compte déjà 1.030 membres, dont 572 membres-aviateurs actifs, 169 pilotes qualifiés titulaires du permis A, et 41 aviateurs particuliers. Les vols effectués au cours de l'année actuelle par tous les avions envisagés représente le respectable total de 13.026 heures. Les affaires déjà considérables traitées par cette compagnie pour la location de ses avions ne cessent d'augmenter, et elle a eu l'occasion de transporter ainsi des voyageurs à destination de tous les pays de l'Europe.

On the new African route shortly to be opened, the first stage from Cairo to Khartoum will be operated by "Argosy" aircraft with geared "Jaguar" engines, the second stage from Khartoum to Kisumu will be operated by Calcutta flying boats (3 geared "Jupiters"), while the final stage from Kisumu to Cape Town will be flown by De Havilland "Hercules" (3 Jupiters). Throughout this route an elaborate organisation has been established, including wireless stations and meteorological bureau, and it can be said that the foundations of this Imperial air route have been very thoroughly laid, with a due regard to initial economy and with every provision for future expansion. Successful developments can, therefore be confidently expected.

NATIONAL FLYING SERVICES, LTD.,

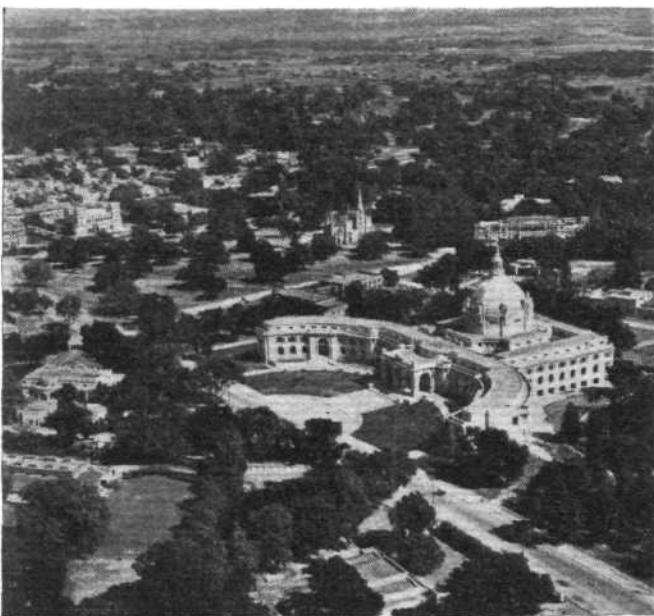
Trafalgar Square, London, W.C.2.

FORMED in April, 1929, this company has but recently finished its first active year of work. It now operates aerodromes and flying clubs at Hanworth, Leeds, Hull, Reading, Nottingham and Blackpool, where the members are provided with club premises, aircraft instructors and have the advantage of reciprocal membership between one club and another. Progress at Hanworth has been phenomenal and the membership is now 1,030, of which 572 are active flying members, 179 are qualified "A" licence pilots and 41 are private owners. The total flying done by the combined aircraft during the present year amounts to 13,026 hours. A very large and growing amount of taxi work has been done by the company and clients have been taken to all countries of Europe.

interés observar que se transportaron desde Inglaterra unos 12.000 kilos de correos por la aludida empresa, durante el trimestre que finalizó el 30 de Septiembre pasado, lo cual representa un aumento del 20 por ciento sobre la cantidad de correos que se transportó durante el trimestre correspondiente del año 1929; de las referidas cifras el correo a la India solamente alcanzó la cifra notable de 3.500 kilos. En la nueva ruta africana que se ha de inaugurar dentro de breve tiempo, la primera etapa desde El Cairo a Khartoum será emprendida por medio de aviones "Argosy" provistos de motores "Jaguar" con engranaje reductor, la segunda etapa desde Khartoum a Kisumu será emprendida por medio de botes voladores del tipo "Calcutta" (dotados de 3 motores "Jupiter."

Constituída en abril de 1929, esta compañía acaba de cumplir su primer ejercicio anual. Actualmente administra varios aeródromos y clubs aéreos en Hanworth, Leeds, Hull, Reading, Nottingham y Blackpool, donde se ponen a la disposición de los socios no solamente locales adecuados sino también instructores de aviación. Pueden igualmente los socios frecuentar los diferentes clubs recíprocamente afiliados.

En Hanworth se ha progresado enormemente. El número de socios asciende hoy a 1030, de los cuales 572 son aviadores activos, 169 pilotos habilitados con certificados oficiales A, mientras que 41 de ellos son aviadores que tienen sus máquinas propias. Los vuelos efectuados por todos los aviones durante el año actual representan no menos de 13.026 horas. La compañía transporta un número considerable de pasajeros, que aumenta constantemente, algunos de los cuales han sido llevados a todos los países europeos.



Left : An Air Survey Co.'s photo from Lucknow.
Right : The main buildings at Heston Airpark.

Gauche : Photographie aérienne de Lucknow par l'Air Survey Co.
Droite : Principaux bâtiments de l'aérodrome de Heston.

Izquierda : Fotografía aérea de Lucknow por la Air Survey Co.
Derecha : Principales edificios del aeródromo de Heston.

POWER PLANT COMPONENTS

PIÈCES DÉTACHÉES POUR MOTEURS

Les bougies AC sont d'un usage très répandu dans la construction des moteurs d'aviation, et leur méthode brevetée d'assemblage—d'après laquelle la douille en acier est soumise à un chauffage électrique puis sertie sur l'isolateur—assure une parfaite étanchéité. Cette maison fabrique aussi d'autres accessoires, tels que filtres à huile, pompes à essence et épurateurs d'air.

Cette usine s'occupe de la construction des pompes à huile brevet "Best," ainsi que d'appareils pour le remplissage des réservoirs, robinets d'huile, et pièces détachées AGS normales approuvées pour les industries aéronautiques par le Ministère de l'Air de notre pays. La haute estime dont jouissent tous les produits "Best"—notamment les accessoires destinés aux installations d'essence—parmi les constructeurs de l'automobile s'étend également aux industries de l'aviation, de sorte que la demande dont sont l'objet les fabrications de cette compagnie ne cesse de progresser.

Les pistons et segments racleurs "Brico" se fabriquent à ces usines avec de la fonte centrifugée et à l'aide d'un outillage spécial breveté. Tous les segments sont contrôlés un par un à toutes les étapes de la fabrication, ce qui assure l'élimination de tout segment qui ne serait pas parfaitement approprié à ses fonctions.

Les magnétos et démarreurs à inertie B.T.-H., fabriqués par la Compagnie de même nom, comportent des modèles appropriés à tous types de moteurs d'aviation. Les magnétos pour moteurs à 2, 3, 4, 5 et 7 cylindres sont du type à induit tournant et produisent deux étincelles par tour de l'induit, tandis que celles destinées aux moteurs à 8, 9, 12 et 14 cylindres, sont du type à inducteur polaire avec induit fixe, et donnent quatre étincelles par tour du rotor. Les paliers de toutes ces magnétos sont bourrés d'une graisse possédant un point de fusion très élevé, de sorte que chaque magnéto est capable de fonctionner pendant au moins 400 heures sans exiger de nouveau graissage. La Compagnie fabrique également deux types de démarreurs à inertie, à actionnement manuel ou électrique. Chez ces deux types, l'énergie d'un petit volant marchant à une vitesse très élevée s'utilise pour faire tourner le moteur par l'entremise d'un réducteur multiple. Un dispositif assurant le déclenchement en cas de surcharge du couple moteur, réalisé sous la forme d'un embrayage à disques multiples, assure la protection nécessaire dans le cas où il se produirait un retour d'allumage au moteur.

AC-SPHINX SPARKING PLUG CO., LTD.,

Bradford Street, Birmingham.

AC PLUGS are widely used in aero engines, and their patented method of assembling, whereby the steel socket is electrically heated and shrunk on to the insulator, ensures perfect case-tightness. Oil filters, fuel pumps and air cleaners are other accessories made by this firm.

BEST & LLOYD,

Handsworth, Birmingham.

"BEST" patented oil pumps, tank fillers, oil taps and standard AGS aircraft fittings as approved by the Air Ministry come from these works. The high esteem in which "Best" fittings, particularly for the fuel installation, are held in the motor-car trade applies equally to the aircraft trade, and there is a growing demand for the products of this company.

BRITISH PISTON RING CO., LTD.,

Holbrook Lane, Coventry.

"BRICO" pistons and scraper rings are made in these works from centrifugal castings, the plant for which is of a special patented design. All rings are individually tested throughout the process of manufacture, entirely eliminating anything but the rings, which are perfect for the job.

THE BRITISH THOMSON-HOUSTON CO., LTD.,

Rugby.

B.T.-H. magnetos and inertia starters are made by the B.T.-H. Company in a range which covers all types of aero engines. Magnetos for 2, 3, 4, 5 and 7-cylinder engines are of the rotating armature type, and produce two sparks per revolution of the armature, and those for 8, 9, 12 and 14-cylinder engines are of the polar inductor type with stationary armature, and produce four sparks per revolution of the rotor. The bearings are in all cases packed with high-melting point grease, and the magnetos will run without any further lubrication for at least 400 hrs. Two forms of inertia starter are made, hand operated and electrically driven. In both types, the energy in a small flywheel, run up to a high speed, is used to rotate the engine from a multiple-gear reduction. A torque overload release, in the form of a multiple-disc clutch, provides a safeguard in the case of an engine back-firing.

COMPONENTES PARA MOTORES

Las bujías de encendido AC se usan extensamente en los motores de aviación, y su método patentado de montaje, mediante el cual el casquillo se calienta eléctricamente y se enzuncha al aislador, asegura la hermeticidad perfecta. Esta casa fabrica también, entre otros accesorios, filtros de aceite, bombas para el combustible y depuradores de aire.

Esta empresa se ocupa de la fabricación de bombas de aceite patentadas marca "Best," así como también de aparatos para rellenar los depósitos, grifos de aceite y piezas sueltas AGS normales aprobadas por el Ministerio de Aviación de la Gran Bretaña. La alta estima de que gozan los productos "Best"—sobre todo los accesorios destinados a las instalaciones de gasolina—entre los constructores de automóviles, se extiende igualmente a las industrias de aviación, de donde resulta que la demanda de que son objeto los productos de esta compañía crece de día en día.

Los talleres de esta casa se ocupan de la fabricación de émbolos y anillos raspadores de la marca "Brico," los cuales se manufacturan de piezas de fundición centrífugas por medio de instalaciones de un diseño especial y patentado. Todos los anillos son comprobados individualmente en todas las fases de su manufactura, mediante lo cual se elimina todo excepto los anillos mismos que de este modo resultan perfectos para el fin a que se destinan.

La Compañía B.T.-H. fabrica magnetos y mecanismos de arranque de inercia, de tal variedad que los hay para todos los tipos de motores de aviación. Las magnetos para motores de 2, 3, 4, 5 y 7 cilindros son del tipo de armadura rotativa y producen dos chispas por cada vuelta de la armadura, mientras que las destinadas para motores de 8, 9, 12 y 14 cilindros son del tipo de inductor polar con armadura estacionaria, y producen cuatro chispas por cada vuelta del rotor. En cada caso los cojinetes están llenados con grasa teniendo un punto elevado de fusión, con el resultado de que las magnetos pueden funcionar por un período mínimo de 400 horas sin lubricación adicional. Se fabrican dos formas de mecanismos de arranque de inercia para funcionamiento a mano y eléctrico. En ambos casos la energía de un pequeño volante que funciona a gran velocidad se usa para hacer girar el motor por el intermedio de un reductor múltiple. Un mecanismo—en forma de un embrague de discos múltiples—para asegurar el desenganche en caso de sobrecarga del par motor, proporciona la protección necesaria para el caso de que se produzca un retroceso de la llama de explosión.

Cette maison fournit des pièces pour moteurs d'aviation, et notamment des pièces estampées, des bielles ainsi que des carters matricés en duralumin.

Ce sont les tubes flexibles portant la marque de fabrique "Petroflex" qui constituent le produit le plus connu de cette maison. Indépendamment de leur flexibilité, ces tubes offrent l'avantage d'être entièrement étanches à l'essence ou à l'huile, et c'est pour cette raison qu'ils sont d'un usage si répandu pour l'installation des moteurs à bord d'un grand nombre d'appareils d'aviation de marques connues.

Voici déjà un nombre considérable d'années que les carburateurs Claudel Hobson constituent l'équipement normal de nombreux moteurs d'aviation. L'espace dont nous disposons ne nous permet pas d'en énumérer ici les différents types, mais il est bon de rappeler que la série complète de cette grande marque comporte des carburateurs appropriés aux moteurs de toutes puissances.

Fabricants de paliers à billes et à rouleaux pour tous usages dans les industries aéronautiques, comme par exemple pour moteurs d'aviation, mécanismes de transmission et de commande, suralimenteurs, mâts d'amarrage, roues d'atterrissage, gouvernails de direction et de profondeur, ainsi que tous organes de manœuvre. Ce palier à rouleaux, d'un usage très répandu dans l'aviation, est du type à rouleaux parallèles de faible longueur, les rouleaux étant espacés au moyen d'une robuste cage en alliage antifricción jaune. Dans bien des cas, les paliers destinés aux constructions aéronautiques se fabriquent sur modèle spécial pour chaque commande, de sorte que les dimensions et le poids puissent se réduire dans toute la mesure possible.

La bougie KLG pour moteurs d'aviation compte parmi les marques les plus connues du monde entier, et la confiance qu'elle inspire s'exprime par ce petit adage "Adoptez et oubliez"—c'est-à-dire plus aucun ennui à craindre. Les bougies de cette marque, dont bien entendu il existe différents modèles appropriés aux moteurs de toutes catégories, ont été utilisées à l'occasion d'un très grand nombre de notables records aéronautiques.

Société se consacrant exclusivement à la fabrication des bougies Lodge, à ses usines de Rugby. Ses produits comprennent des types répondant aux besoins des moteurs d'aviation de toutes catégories. Ajoutons qu'il a été utilisé des bougies de cette marque à l'occasion de nombreux raids retentissants.

Cylindres, culasses de cylindre, carters de moteur, et—à vrai dire—toute une grande variété de moulages utilisés par bon nombre de constructeurs renommés de moteurs d'aviation, tels sont les produits de cette compagnie. Ces pièces se font d'ailleurs à l'aide d'un fer spécial pour cylindres de moteurs d'aviation, ainsi qu'au moyen de nombreux autres alliages appropriés à la fabrication des pièces qu'exigent les moteurs en question.

ENGLISH STEEL CORP., LTD.,

Broadway, London, S.W.1.

THIS firm supplies aero-engine components, including such things as stampings, connecting rods, and also crank-case stampings of duralumin.

HOBDELL & WAY,

Minorities, London, E.1.

FLEXIBLE tubing bearing the registered name of Petroflex is the well-known product of this firm. This tubing besides being flexible is completely impervious to petrol or oil and as such is very widely used in the engine installation of many well-known aircraft.

H. M. HOBSON, LTD.,

47, Acton Vale, London, W.3.

CLAUDEL Hobson carburettors are the standard fitting on many aero engines and have been for a considerable number of years. Space does not permit enumeration of the various types, but their range provides a carburettor suitable for all sizes of engine.

THE HOFFMANN MANUFACTURING CO., LTD.,

Chelmsford.

MANUFACTURERS of ball and roller bearings for all aviation uses such as aero engines, transmission and control gears, superchargers, mooring masts, landing-wheels, rudders, elevators and all control services. The roller bearing, which is extensively used in aircraft, is of the short, parallel roller type, the rollers being spaced by means of a stout cage of yellow non-friction alloy. In many cases in aircraft, the bearings are specially designed for each job in order that the dimensions and weight may be as small as possible.

K.L.G. SPARKING PLUGS, LTD.,

Putney Vale, London, S.W.15.

K.L.G. Plugs are among the best known aero-engine plugs in the world and their slogan "fit and forget" is ample proof of the high regard in which they are held. Different models are, of course, made for all classes of engine, and they have been used in a very large number of record flights.

LODGE PLUGS, LTD.,

Rugby.

LODGE plugs are the sole product of this Company's factory at Rugby. There are types of plugs suitable for all classes of aero engine, and they have been used on many of the notable flights.

MIDLAND MOTOR CYLINDER CO., LTD.,

Smethwick Staffs.

CYLINDERS, cylinder-heads, crank-cases and, in fact, a very large range of the castings used by many of the prominent aero-engine manufacturers are made by this Company. These are in their special aero-engine cylinder iron, and also in many other alloys suitable for the engine parts in question.

Esta empresa se dedica al suministro de piezas componentes para motores de aviación, incluyendo tales accesorios como piezas estampadas, bielas de conexión, así como también piezas de duraluminio estampadas para cárters de cigüeñal.

Los tubos flexibles que llevan la marca de fábrica "Petroflex" constituyen el renombrado producto de esta casa. Aparte de su flexibilidad, estos tubos ofrecen la ventaja de ser completamente impermeables a la gasolina y al aceite, y por tal causa se emplean extensamente en la instalación de motores montados en las máquinas voladoras más conocidas.

Hace muchos años que los carburadores Claudel Hobson constituyen el equipo normal de numerosos motores de aviación. El espacio de que disponemos no nos permite enumerar sus varios tipos, pero debemos mencionar que su serie completa comprende carburadores adecuados para motores de todas las potencias.

Fabricantes de cojinetes de bolas y cojinetes de rodillos para todos los usos de la aviación, tales como motores para aviones, mecanismos de transmisión y control, dispositivos de alimentación forzada, mástiles de amarre, ruedas de aterrizaje, timones de dirección y de profundidad y todos los aparatos de control. El cojinete de rodillos, extensamente usado en los aviones, es del tipo de rodillos cortos y paralelos, hallándose éstos espaciados mediante una jaula fuerte de aleación amarilla de antifricción. En numerosos casos los cojinetes para aviones se diseñan especialmente para cada una de sus funciones, a fin de reducir en todo lo posible las dimensiones y el peso.

Las bujías KLG se cuentan entre las más conocidas en el mundo entero, y la confianza que inspiran se resume en la frase "Adopte y olvide." Se fabrican, por supuesto, diferentes modelos para motores de todas clases, y se han empleado en un gran número de notables records aeronáuticos.

Esta compañía se dedica exclusivamente a la manufactura de bujías en su fábrica de Rugby. Sus productos comprenden bujías adecuadas para motores de aviación de todas clases, las cuales han sido usadas en muchos de los vuelos más notables.

Esta empresa fabrica cilindros, culatas de cilindros y, en realidad, un extenso surtido de las piezas de fundición que usan las compañías más prominentes en la manufactura de motores de aviación. Emplea en la fundición de estas piezas su hierro especial para cilindros de esta clase de motores, aparte de otras muchas aleaciones adecuadas para las piezas que exigen los motores en cuestión.

Cette maison s'occupe de la fabrication des magnétos Watford, dont il existe une gamme très variée, répondant aux exigences des moteurs d'aviation de toutes puissances. Il est intéressant de noter que ce sont ces magnétos qui avaient été montées sur les moteurs Rolls-Royce utilisés à l'occasion de la première traversée de l'Atlantique, ainsi que pour le premier vol effectué à destination de l'Australie.

Fabricants du liquide d'obturation "L'Hermetic," substance permettant d'établir des joints parfaits rien que par son application au pinceau, de sorte que son utilisation se traduit par une forte économie de temps et d'argent pour le remontage des moteurs.

Maison se consacrant à la fabrication de billes et de rouleaux en acier de toutes grandeurs, également de paliers à rouleaux, à alignement automatique, à une seule ou à double rangée. L'une de ses spécialités est constituée par les roulements à billes appropriés aux vitesses extrêmement élevées.

La maison Rotherham fournit tous genres d'accessoires AGS pour appareils d'aviation. Ces derniers, bien trop nombreux pour que nous puissions les énumérer ici, comprennent des articles tels que: filtres à essence, brides, raccords pour robinets de vidange, bouchons de trous de remplissage, raccords de tuyauterie, etc.

NORTH & SONS, LTD.,

Watford.

MAKERS of Watford magnetos, which are manufactured in a wide range suitable for all sizes of aero engines, it is interesting to note that these magnetos were fitted to the Rolls-Royce engines used on the first flight across the Atlantic and also on the first flight to Australia.

PATENT MOTOR PRODUCTS CO.,

11, Store Street, London, W.C.1.

MAKERS of "Hermeticoll" liquid jointing, a substance which makes perfect joints by merely being brushed on, and therefore saves a large amount of time and money when re-assembling engines.

RANSOME & MARLES BEARING CO.,

Newark-on-Trent.

STEEL balls and rollers of all sizes, and also single-row, double-row, self-aligning and roller journal bearings are made by Ransome's. One of their specialities is ball-bearings suitable for very high speeds.

ROTHERHAM & SONS,

Coventry.

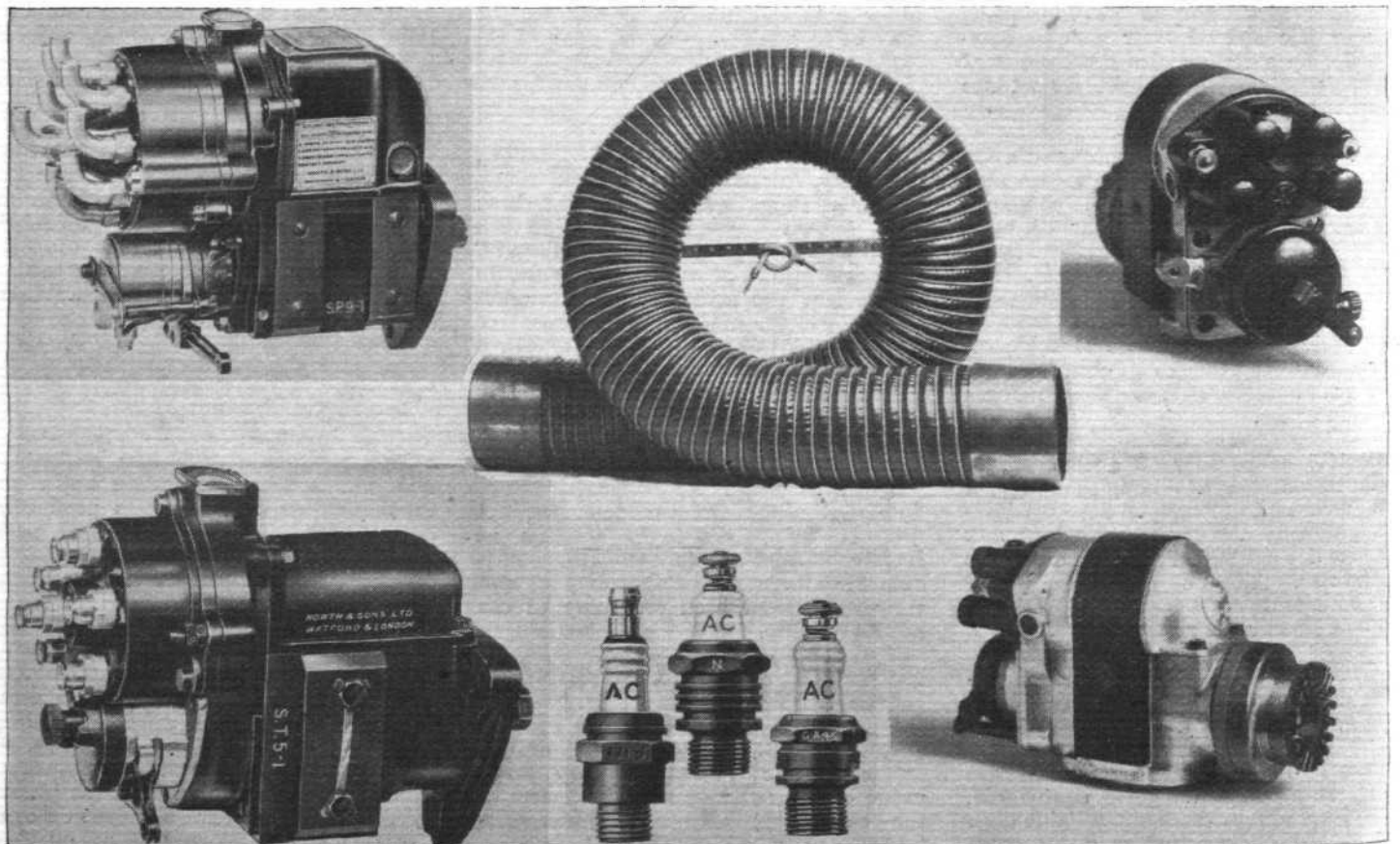
ALL types of AGS aircraft accessories are supplied by Rotherham. These are too many to mention here, but include such articles as petrol filters, flanges, drain cocks unions, filler-caps, pipe connections, etc.

Esta casa se dedica a la fabricación de un extenso surtido de magnétos adecuadas para motores de aviación de todos los tamaños. Debe citarse el hecho de que estas magnétos fueron montadas en los motores Rolls-Royce que se usaron en el primer vuelo a través del Atlántico y también en el primer vuelo a Australia.

Fabricantes del líquido de obturación "L'Hermetic," una substancia que permite hacer uniones perfectas sin más que aplicarla con el pincel. Por lo tanto, economiza considerablemente tiempo y dinero en el montaje de los motores.

Se dedica esta compañía a la fabricación de bolas y rodillos de todos los tamaños y también de cojinetes de rodillos, de alineación automática, de hilera sencilla o doble. Entre sus productos especiales deben citarse sus cojinetes de bolas adecuados para grandísimas velocidades.

La compañía Rotherham suministra accesorios AGS de todos los tipos para aviones. Aunque son demasiado numerosos para citarlos aquí, puede indicarse que incluyen tales artículos como filtros de gasolina, bridas, uniones de grifos para el vaciado, tapas para agujeros de carga, conexiones de tubos, etc.



Watford magnetos (left), B.T.H. magnetos (right), a length of Superflexit tubing and AC Sphinx sparking plugs.
Magnétos Watford (gauche), magnétos B.T.H. (droite); tuyau Superflexit, et bougies AC Sphinx.
Magnétos Watford (izquierda), magnétos B.T.H. (derecha); tubo Superflexit, y bujías AC Sphinx.

Les usines de cette compagnie se consacrent à la fabrication des magnétos Simms pour moteurs d'aviation, ainsi qu'à celle de jauges magnétiques d'essence, épurateurs d'air, filtres pour l'huile, et accouplements à vernier.

Fabricants de roulements à billes et de paliers à rouleaux, de toutes dimensions, pour moteurs d'aviation et constructions aéronautiques en général.

Le Specialoid est un alliage à base d'aluminium possédant un faible coefficient de dilatation, créé tout particulièrement pour servir à la fabrication des pistons de moteurs d'aviation. Les pistons ainsi fabriqués comportent huit nervures intérieures soutenant le pourtour inférieur ainsi que les bossages destinés à l'axe. Ces nervures, disposées de façon à éviter toute déformation, offrent une surface de refroidissement extrêmement considérable.

Le tube "Superflexit" comporte un revêtement intérieur breveté qui le soustrait d'une façon permanente à l'action de l'essence, du benzol, et des huiles à base d'hydrocarbure. Ces tubes, approuvés par le Ministère de l'Air de Grande Bretagne pour s'employer sur tous les appareils d'aviation dans leurs installations d'essence, d'eau et d'huile, s'utilisent également pour les appareils respiratoires à oxygène.

Cette maison a débuté dans l'industrie aéronautique en 1916, époque à laquelle elle a organisé un service spécial consacré aux pièces détachées et embouties en métal. Depuis la guerre, elle s'occupe énormément de la fabrication de tubulures d'échappement, et s'est livrée à pas mal d'expériences relatives à l'emploi du fer et de divers alliages inoxydables.

Le fonctionnement des moteurs d'aviation dépend énormément des segments dont sont munis leurs pistons. Or la maison Wellworthy se fait une spécialité de la fabrication de segments répondant aux exigences de tous moteurs, et ceux qu'elle destine aux moteurs d'aviation, fabriqués à l'aide d'une matière conforme à la spécification 4 K. 6 du Ministère de l'Air de Grande Bretagne, sont utilisés par un nombre considérable de grands constructeurs.

La fabrication des carburateurs Zenith pour moteurs d'aviation remonte déjà à 1913, et cette usine dispose de vastes laboratoires où il est possible de reproduire exactement les conditions éventuelles du vol, ainsi que les changements que sont susceptibles de subir pression atmosphérique, température et humidité. Les carburateurs Zenith font d'ailleurs partie de l'équipement normal d'un très grand nombre de moteurs d'aviation se construisant en Angleterre et à l'étranger. Cette même usine fabrique également un filtre à essence ne pesant que 765 grammes, et susceptible pourtant de débiter près de 682 litres à l'heure.

SIMMS MOTOR UNITS, LTD., Rathbone Place, London, W.1.

SIMMS aircraft magnetos, magnetic petrol gauges, air-cleaners, oil filters and vernier couplings are manufactured in the works of this Company.

THE SKEFKO BALLBEARING CO., LTD.,

109, Kingsway, W.C.2.
MAKERS of ball-bearings and roller-bearings of all sizes for aero-engine and general aircraft work.

SPECIALOID, LTD., Finchley, London, N.12.

SPECIALOID is a low-expansion aluminium alloy which has been evolved particularly for aero-engine pistons. Pistons constructed by this firm are provided with eight internal ribs supporting the skirt and gudgeon pin bosses, in a manner which eliminates distortion and offers an extremely large cooling surface.

SUPERFLEXIT, LTD., Slough, Bucks.

SUPERFLEXIT tubing has a patented lining which is permanently impervious to the action of petrol, benzole and hydro-carbon oils. This tubing is approved by the Air Ministry for use on all aircraft for petrol, oil and water installations, and is also in use for the oxygen breathing apparatus.

THOMPSON BROS., LTD., Bilston, Staffs.

THIS company first entered the aircraft industry in 1916 when they started a department to deal with metal components and pressings. Since the war they have largely been engaged on the production of exhaust manifolds, and experiments have been carried out in stainless iron and alloys.

WELLWORTHY, LTD., Lymington, Hants.

AIRCRAFT engines very largely depend for their satisfactory working on their piston rings, and Wellworthy is a firm which specialises in the manufacture of piston rings to suit all engines. Those for aircraft engine use are made from material conforming to the Air Ministry specification 4 K. 6, and are used by a large number of the leading makers.

ZENITH CARBURETTER CO., 40, Newman Street, London, W.1.

ZENITH carburetters for aero-engines have been made since 1913 and in the works there are extensive laboratories where flying conditions and changes of atmospheric pressure, temperature and humidity can be reproduced. Zenith carburetters are standard on very many aero-engines both in this country and abroad. Another production from the same works is a petrol filter which weighs only 27 ozs. and can yet pass 150 gallons of fuel per hour.

Esta casa se dedica a la fabricación de magnetos para motores de aviación, así como también de indicadores magnéticos del nivel de la gasolina, depuradores de aire, filtros para el aceite y acoplamientos vernier.

Fabricantes de cojinetes de bolas y cojinetes de rodillos de todos los tamaños para motores de aviación y construcciones aeronáuticas en general.

"Specialoid" es una aleación a base de aluminio que posee un débil coeficiente de dilatación y que ha sido creada especialmente para la fabricación de émbolos de motores de aviación. Los émbolos así contruidos están provistos de ocho nervios interiores de refuerzo que soportan el contorno inferior y los núcleos destinados al eje. Estos nervios, dispuestos en forma que evitan toda deformación, ofrecen una superficie de enfriamiento sumamente amplia.

Los tubos "Superflexit" tienen un revestimiento interior patentado que es permanentemente impermeable a la acción de la gasolina, el benzol y los aceites a base de hidrocarburo. Estos tubos que han sido aprobados por el Ministerio de Aviación de la Gran Bretaña para su empleo en toda clase de aparatos de aviación para las instalaciones de gasolina, aceite y agua, se usan igualmente en los aparatos para la respiración de oxígeno.

Esta compañía entró a formar parte de la industria aeronáutica en 1916, año en que organizó un servicio especial de piezas metálicas sueltas y embutidas. Desde que terminó la guerra se ha dedicado principalmente a la producción de diversos tubos de escape, habiendo hecho también muchos experimentos relativos al empleo del hierro y de aleaciones inoxidables.

Los motores de aviación dependen en gran parte de los anillos del émbolo para su funcionamiento satisfactorio. La casa Wellworthy se dedica especialmente a la manufactura de estos anillos, y dispone de surtidos extensos y adecuados para todos los motores. Los que se emplean para los motores de aviación se hacen con un material que se ajusta a la especificación 4 K. 6 del Ministerio de Aviación de la Gran Bretaña, y son usados por un gran número de los fabricantes más prominentes.

La fabricación de los carburadores Zenith para motores de aviación data de 1913. La fábrica de esta compañía dispone de extensos laboratorios en los cuales pueden reproducirse las condiciones eventuales del vuelo y los cambios de presión atmosférica, temperatura y humedad. Los carburadores Zenith forman parte del equipo normal en muchos motores de aviación, tanto en la Gran Bretaña como en otros países. Otro de los productos de esta fábrica es un filtro de gasolina que solo pesa 765 gramos y que, no obstante, puede filtrar aproximadamente 682 litros de combustible por hora.

TYRES, WHEELS AND BRAKES

PNEUS, ROUES ET FREINS

Société se consacrant à la vente des freins hydrauliques Lockheed pour appareils d'aviation, également du filtre Purolator pour avions, dispositif de filtrage très simple par lequel ne cesse de circuler l'huile que contient le carter du moteur.

Maison qui fabrique les freins et roues Bendix-Perrot pour avions, selon une gamme comportant un grand nombre de dimensions différentes. Ces roues sont principalement du type à disque, et les freins—généralement actionnés par un câble—sont munis de sabots offrant une surface de freinage exceptionnellement développée. D'un fonctionnement simple, cet agencement a rendu d'excellents services sur de nombreux types d'avions en usage dans notre pays.

AUTOMOTIVE PRODUCTS CO., LTD.

3, Berners St., London, W.1.

LOCK-HEED Hydraulic Aircraft Brakes are marketed by this Company, and also the Purolator aircraft filter, which is a simple filter through which the crankcase oil is continuously circulated.

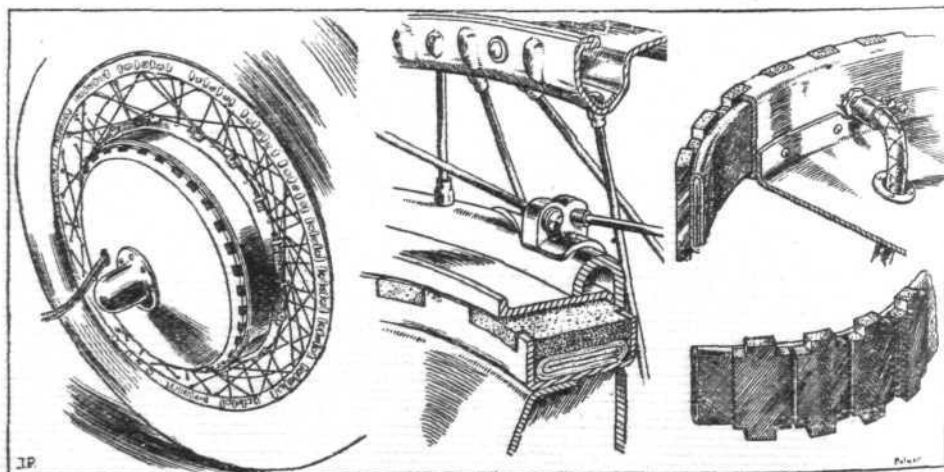
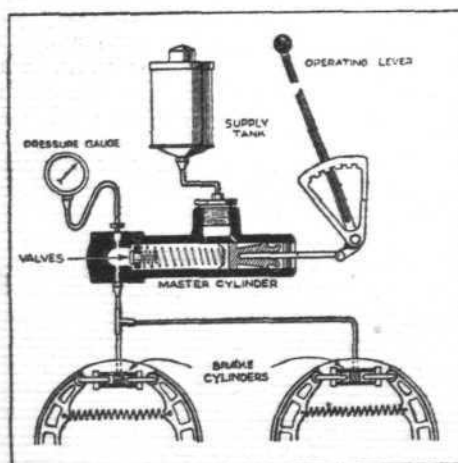
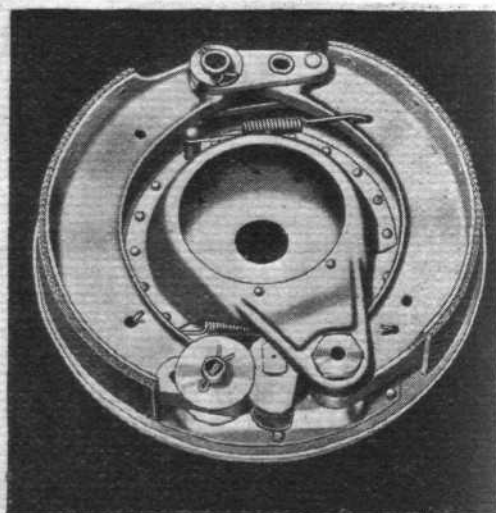
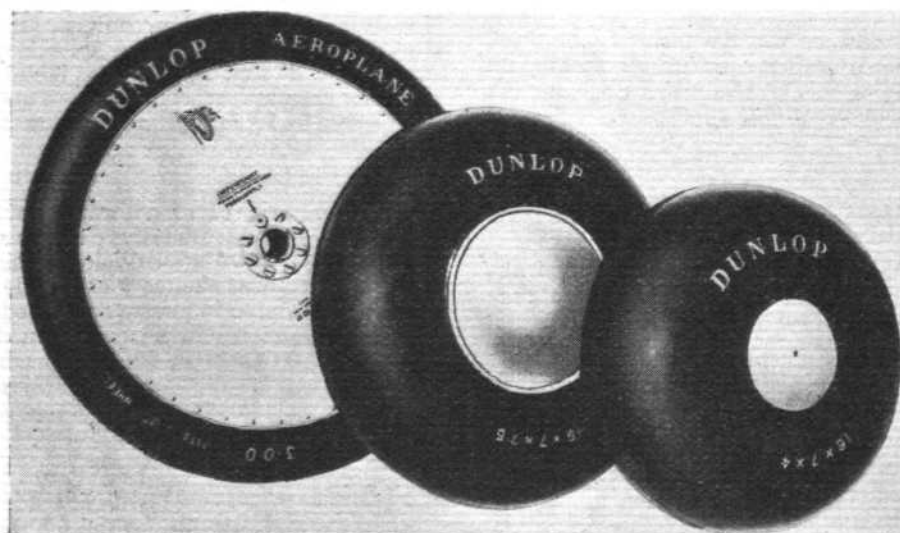
BENDIX-PERROT BRAKES, LTD., Birmingham.

THIS firm makes Bendix-Perrot brakes and aircraft wheels in a large range of sizes. These are mostly of the disc type of wheel, and the brakes, which are usually operated by cable, have shoes providing an exceptionally large braking surface. They are simple in action, and have given good service on many types of aircraft in this country.

BANDAJES, RUEDAS Y FRENS

Esta compañía se dedica al suministro de los frenos hidráulicos "Lockheed" para aparatos de aviación, así como también del filtro "Purolator" para aviones, siendo éste un filtro muy sencillo por el cual circula constantemente el aceite del cárter del cigüeñal.

Esta casa fabrica un gran surtido de frenos y ruedas para aeroplanos, que llevan la marca Bendix-Perrot. Las ruedas son en su mayor parte del tipo de disco, y los frenos, que generalmente son de funcionamiento de cable, disponen de zapatas que proveen una superficie de frenamiento excepcionalmente amplia. Su manejo es sencillo y han prestado un servicio excelente en muchos tipos de aeroplanos en Inglaterra.



Above: Dunlop tyres and wheels, and a Bendix-Perrott brake. Below: the Lockheed braking system (left), and the Palmer system (right).

Haut: Pneus et roues Dunlop, et frein Bendix-Perrot. Bas: Système de freinage Lockheed (gauche) et système de freinage Palmer (droite).

Arriba: Bandajes y ruedas Dunlop, y freno Bendix-Perrot. Abajo: Sistema de frenaje Lockheed (izquierda) y sistema de frenaje Palmer (derecha).

Pneus à tringles et roues à disque—telle est la combinaison que, sous le jour des connaissances actuelles, la Compagnie Dunlop estime constituer l'agencement le mieux approprié aux besoins des appareils d'aviation. L'adoption de ce type est la conséquence d'une somme considérable de recherches et d'expériences, et il s'est d'ailleurs réalisé au cours de ces dernières années de très grands progrès. C'est ainsi qu'en 1927 la roue Dunlop de 305 × 890 à rayons métalliques pesait plus de 36 kgs., tandis que sa charge critique n'égalait que 12.700 kgs. En 1928, la roue à rayons métalliques de mêmes dimensions ne pesait plus que 33 kgs. 500 alors que la charge critique était déjà passée à 17.689 kgs. Mais, à présent, depuis l'adoption de la roue à disque, bien que pour les mêmes dimensions le poids en ait été ramené à 30 kgs. 390, la charge critique en a été portée à 22.679 kgs. Cette roue comporte une jante profilée en duralumin refoulé à la presse, un moulage en electron pour le moyeu, et une garniture intérieure en acier embouti, encastrée dans la roue, pour le frein. La Compagnie Dunlop fournit également des pneus sans roue—connus familièrement sous le nom pittoresque de "Doughnuts" (beignets soufflés)—construction pour laquelle le pneu est monté directement sur le moyeu.

La roue pneumatique Goodyear constitue l'une des créations les plus remarquables de ces dernières années, ayant apporté une véritable révolution dans la construction des pneus et roues pour avions. Il s'agit en somme d'une enveloppe qui remplit le double rôle de pneu et de roue, puisque, tout considéré, l'enveloppe est montée directement sur le moyeu. Le pneu réalisé sous cette forme permet d'atterrir en sécurité aussi bien dans la neige que sur la glace et dans la boue. Le volume d'air bien plus considérable qu'emmagasine l'enveloppe procure un effet comparable à celui que produirait l'interposition d'un coussin, de sorte qu'on a pu construire ainsi de nombreux petits appareils dont le train d'atterrissage ne comporte pas d'autre dispositif amortisseur.

La Maison Palmer s'occupe de la fabrication des pneus d'avions depuis les premiers jours de l'aviation, et, actuellement, fidèle à sa tradition toujours éprise de progrès, elle vient de mettre au point un type de frein aussi ingénieux qu'efficace, destiné à se monter sur les roues d'atterrissage de sa construction. Ce frein, d'un poids exceptionnellement réduit, se compose essentiellement d'une chambre d'expansion à laquelle se rattache un cercle complet de sabots de frein. Le fonctionnement de cette chambre s'obtient au moyen de la pression d'air que fournit un cylindre flexible à air—autre innovation de la maison Palmer. La pression d'air est assujettie au contrôle exercé par un dispositif à pied de fonctionnement fort simple. Étant donné que le coefficient de contact entre les sabots de frein et le tambour est presque égal à 100 pour cent, ce genre de frein permet de prévoir un tambour bien plus léger que ceux qu'on utilise normalement, sans avoir à craindre la moindre déformation.

DUNLOP RUBBER CO., LTD., Erdington, Birmingham.

WIRED-ON tyres and disc wheels are the combination now being marketed by the Dunlop Co. as most suitable in light of present knowledge, for use with aircraft. The adoption of this type has been the result of a great deal of experiment and research, and of late years very great advance has been made. For example, in 1927 the Dunlop 12 in. × 35 in. wire wheel weighed 80 lb., and had a failing load of 28,000 lb.; in 1928, the same size wire wheel was produced, weighing only 74 lb., but the failing load had been increased to 39,000 lb. Now, however, since the adoption of the disc type of wheel, the weight for the same size has been reduced to 67 lb., with a still further increased failing load of 50,000 lb. The rim of these wheels is made from extruded Duralumin section, with an Elekron casting for the hub, and a pressed steel liner recessed into the wheel for the brake. Wheelless tyres or "Doughnuts," as they are popularly called, a type where the tyre is mounted directly on to the hub, are now supplied by Dunlop. A further type is being developed, in which the cross section of the tyre nearly equals all that of the wheelless type, but the internal diameter round the hub has been increased, allowing the introduction of an efficient brake.

GOODYEAR TYRE & RUBBER CO. (GT. BRITAIN), LTD., Wolverhampton.

ONE of the most revolutionary developments in aeroplane tyres and wheels of recent years has been the Goodyear air wheel. In this type, the cover has the dual duty of tyre and wheel, since it is, to all intents and purposes, mounted directly on the hub. With this form of tyre, safe landings may be made in snow, ice and mud, and the increased air capacity gives an extreme cushion effect, so much so that many small machines have been built with no other shock-absorbing device on their undercarriage.

PALMER TYRE CO., LTD.,

100, Cannon Street, London, E.C.4.
PALMERS have manufactured aero tyres since the earliest days of aviation, and now, in accordance with their up-to-date and go-ahead methods, they have produced an original and efficient brake for inclusion in their landing wheels. This is exceptionally light in weight, and consists essentially of an expansion chamber to which is attached a complete ring of brake blocks. This expansion chamber is operated by air pressure obtained from a flexible air cylinder—another Palmer innovation. This air pressure is controlled by a foot control which is very simple in operation. Having, as it has, nearly 100 per cent. contact between the brake blocks and the drum, this form of brake allows of a drum which can be much lighter than is normally employed, without fear of distortion occurring.

Como resultado de la experiencia adquirida en los últimos años, la Compañía Dunlop ha lanzado al mercado una combinación de bandajes de tipo alambrado y ruedas de disco que se considera como la más adecuada para los aviones. Este tipo ha sido adoptado después de cuidadosas investigaciones y de numerosos experimentos que han contribuido en grado sumo a los progresos realizados recientemente. Por ejemplo, en 1927 la rueda Dunlop de 305 × 890 con rayos de alambre pesaba más de 36 kgs., siendo la carga crítica de unos 12.700 kgs. En 1928 se produjo una rueda con rayos de alambre del mismo tamaño pesando 33½ kgs., pero su carga crítica había aumentado a 17.689 kgs. Sin embargo, con la adopción de la rueda de tipo de disco, el peso de ésta, del mismo tamaño, se ha reducido a 30,39 kgs., habiendo aumentado la carga crítica a 22.679 kgs. La llanta de estas ruedas se hace de duraluminio estrujado con prensa, con una pieza de fundición en electron para el cubo y una guarnición de acero embutido insertada en la rueda para el freno. Suministra ahora la casa Dunlop bandajes sin rueda o "Doughnuts" (bolos)—nombre con que se los conoce familiarmente en nuestro país—tratándose de un tipo en que el bandaje se monta directamente sobre el cubo.

Una de las creaciones más notables de los últimos años, en relación con los bandajes y ruedas para aeroplanos, ha sido la rueda neumática Goodyear. En este tipo la cubierta tiene la doble misión de actuar como bandaje y como rueda, pues en realidad está montada directamente sobre el cubo. Con esta forma de bandaje pueden efectuarse actualmente aterrizajes seguros sobre la nieve, el hielo y el barro, pues la mayor capacidad de aire produce un verdadero efecto de cojín, hasta el punto de que se han construido muchas máquinas pequeñas sin otro amortiguador de choques en su tren de aterrizaje.

La empresa Palmer ha fabricado bandajes para aeroplanos desde los primeros días de la aviación, y actualmente, continuando sus métodos progresivos, ha producido un freno original y eficiente para inclusión en sus ruedas de aterrizaje. Es éste de un peso excepcionalmente ligero y consiste esencialmente en una cámara de expansión a la cual se agrega un círculo completo de collares de freno. Esta cámara de expansión funciona por presión de aire que se obtiene de un cilindro de aire, flexible—otra innovación de la compañía Palmer. Esta presión de aire se halla gobernada por un control de pedal que es de funcionamiento muy sencillo. En vista de que tiene cerca de un 100 por ciento de contacto entre los collares del freno y el tambor, esta forma de freno permite fijar un tambor que puede ser mucho más ligero que los que se emplean normalmente, sin temor a que ocurra la menor contorsión.

WOOD SUPPLIERS

BOIS, FOURNISSEURS DE

Le contre-placage "Mallite" s'emploie énormément parmi les maisons qui s'occupent encore de la construction des avions en bois. D'ailleurs, même les avions en métal offrent toujours au contre-placage un nombre considérable d'utilisations, de sorte que ce genre de fournitures est l'objet d'une demande suivie. Citons encore le contre-placage "Balsa," chez lequel on intercale du bois de balsa entre deux placages d'un bois plus dur, ce qui donne un article extrêmement léger, approprié pour les cloisons et le revêtement des cabines, et, dans ce cas, ce contre-placage offre également l'avantage de ses excellentes propriétés insonores.

Ces maisons également figurent parmi celles qui se trouvent en mesure de fournir toutes les essences de bois dont on a besoin dans les industries de l'aéronautique.

AERONAUTICAL & PANEL PLY-WOOD CO., LTD.,

218, Kingsland Road, London, E.2.

"MALLITE" plywood is very largely used among aircraft manufacturers, who still build wooden aircraft. Even in metal aircraft construction there still remains a vast number of uses which require plywood, and the demand for this form of material is great. "Balsa" plywood is another of their products in which Balsa wood is sandwiched between two veneers of some harder wood, the result being an exceptionally light material suitable for partitions and cabin linings, an added advantage in this case being its sound-proof qualities.

LOUIS BAMBERGER & SONS,

27, Finsbury Square, London, E.C.2.

W. MALLINSON & SON, LTD.,

130, Hackney Rd., London, E.2.

THESE firms are also among those who supply every variety of timber which is required in the aircraft trade.

MADERAS, PROVEEDORES DE

La madera contraplacada "Mallite" se usa extensamente entre los fabricantes que construyen todavía aviones de madera. Hasta en la construcción de aviones de metal existen aún numerosos usos para la madera contraplacada, de donde resulta que la demanda de este material continua siendo considerable. La madera contraplacada "Balsa" es otro de estos productos, en el cual se intercala una tira de madera de balsa entre dos capas de alguna madera dura, lo que da un material excepcionalmente ligero, muy adecuado para divisiones y revestimientos de cabinas, teniendo además en este caso la ventaja de sus cualidades amortiguadoras del ruido.

Estas casas se cuentan entre las que suministran las maderas de todas clases que se necesitan en la industria de la aviación.

BRITISH AIRCRAFT TRADE DIRECTORY.

INDICATEUR DE L'AVIATION BRITANNIQUE

DIRECTORIO DE LA AVIACIÓN BRITÁNICA

AIRCRAFT COMPONENTS

Pièces Détachées pour Avions
Componentes para Aviones

- Arens Control, Ltd.,
14, Regent Street, London, S.W.1.
- The Airscrew Co., Ltd.,
Weybridge, Surrey.
- Auster, Ltd.,
Crown Works, Barford Street, Birmingham.
- Bakelite, Ltd.,
68, Victoria Street, London, S.W.1.
- Brown Bros., Ltd.,
Great Eastern Street, London.
- Bruntons, Ltd.,
Wire Mills, Musselburgh, Scotland.
- Burley, Ltd.,
192, Tottenham Court Road, London, W.1.
- Caxton Name Plate Manufacturing Co., Ltd.,
11, Rochester Row, London, S.W.1.
- Fairey Aviation Co., Ltd.,
Hayes, Middlesex.
- J. W. Gates & Co., Ltd.,
133, Oxford Street, London, W.1.
- Industrial Rubber Manufacturers, Ltd.,
191-2, Tottenham Court Road, London, W.1.
- Inshaw Accessories, Ltd.,
68, Farm Lane, London, S.W.6.
- Metal Propellers, Ltd.,
Purley Way, Croydon.
- Frederick Mountford (Birmingham), Ltd.,
Fremo Works, Mosely Street, Birmingham.
- Rubery Owen & Co., Ltd.,
Darlaston, South Staffs.
- Triplex Safety Glass Co., Ltd.,
1, Albemarle Street, Piccadilly, London, W.1.
- Vickers-Armstrong, Ltd.,
Broadway, Westminster, London, S.W.1.
- Vaughan Bros., Ltd.,
Willenhall, Staffordshire.

AERO ENGINE MANUFACTURERS

Constructeurs de moteurs d'aviation
Constructores de motores de aviación

- A.B.C. Motors, Ltd.,
Walton-on-Thames, Surrey.
- Armstrong Siddeley Motors, Ltd.,
Coventry.
- British Salmson Aero Engines, Ltd.,
New Malden, Surrey.
- The Bristol Aeroplane Co., Ltd.,
Filton House, Bristol.
- Cirrus Aero Engines, Ltd.,
Purley Way, Waddon, Croydon, Surrey.
- Pobjoy Air Motors, Ltd.,
Hooton Park Aerodrome, Cheshire.
- D. Napier & Son, Ltd.,
Acton, London, W.3.
- Rolls-Royce, Ltd.,
14-15, Conduit Street, London, W.1.

AERODROME EQUIPMENT

Aérodromes, Equipement pour
Aeródromos, Equipos para

- W. Bain & Co., Ltd.,
Lochrin Iron Works, Coatbridge.
- S. F. Bowser & Co., Inc.,
Windsor House, Victoria St., London, S.W.1.
- Cellactite & British Uralite, Ltd.,
Higham, Kent.
- Chance Bros. & Co., Ltd.,
Lighthouse Works, Smethwick, Birmingham.
- Educational Supply Association, Ltd.,
171, High Holborn, London, W.C.1.
- The En-Tout-Cas Co., Ltd.,
Syston, nr. Leicester.
- Harvey Frost & Co., Ltd.,
148-150, Great Portland Street, London, W.1.
- Horseley Bridge Engineering Co., Ltd.,
Birmingham.
- James Hunter, Ltd.,
Chester.
- The London Electric Firm,
South Croydon, Surrey.
- Ripon Steel Co., Ltd.,
Ripon.

CLOTHING

Vêtements, etc.
Ropas, etc.

- Alkit, Ltd.,
Cambridge Circus, London, W.C.2.
- Austin Reed Ltd.,
Regent Street, London, W.1.
- Burch's,
33, Bedford Street, London, W.C.2.
- Gieves, Ltd.,
21, Old Bond Street, London, W.1.
- D. Lewis,
124, Great Portland Street, London, W.1.
- S. Lewis,
19-27, Carburton Street, London, W.1.
- E. B. Meyrowitz, Ltd.,
1A, Old Bond Street, London, W.1.
- J. Moss, Ltd.,
Charing Cross Road, London, W.C.2.
- Selfridge & Co., Ltd.,
Oxford Street, London, W.1.
- Wainwrights,
300/2, Euston Road, London, N.W.1.
- A. W. Gamage, Ltd.,
Marble Arch, London, W.1.
- Robinson & Cleaver, Ltd.,
156, Regent Street, London, W.1.

AIRCRAFT MANUFACTURERS

Constructeurs d'avions
Constructores de aviones

- Sir W. G. Armstrong Whitworth Aircraft, Ltd.,
Whitley, Coventry.
- The Blackburn Aeroplane & Motor Co., Ltd.,
Brough, Yorkshire.
- Boulton & Paul, Ltd.,
Norwich.
- The Bristol Aeroplane Co., Ltd.,
Filton House, Bristol.
- The Cierva Autogiro Co., Ltd.,
Bush House, Aldwych, London, W.C.2.
- The Civilian Aircraft Co., Ltd.,
Horniglow Road North, Burton-on-Trent.
- The Comper Aircraft Co., Ltd.,
Hooton Park Aerodrome, Cheshire.
- The De Havilland Aircraft Co., Ltd.,
Stag Lane Aerodrome, Edgware, Middlesex.
- Desoutter Aircraft Co., Ltd.,
Croydon Aerodrome, London, S.W.
- The Fairey Aviation Co., Ltd.,
Hayes, Middlesex.
- The Gloster Aircraft Co., Ltd.,
Hucclecote, Gloucester.
- Handley Page, Ltd.,
Cricklewood, London, N.W.2.
- The Hendy Aircraft Co., Ltd.,
Shoreham-by-the-Sea, Sussex.
- The Monospar Co., Ltd.,
Byron House, St. James's St., London, S.W.1.
- Navarro Safety Aircraft, Ltd.,
Heston Air Park, Heston, Middlesex.
- George Parnall & Co., Ltd.,
Yate Aerodrome, Gloucestershire.
- Robinson Aircraft Co., Ltd.,
Stafford Road, Croydon, Surrey.
- A. V. Roe & Co. Ltd.,
Newton Heath, Manchester.
- Saunders-Roe, Ltd.,
East Cowes, Isle of Wight.
- Short Bros. (Rochester & Bedford), Ltd.,
Rochester, Kent.
- Southern Aircraft, Ltd.,
Shoreham-by-the-Sea, Sussex.
- Spartan Aircraft, Ltd.,
Weston, Southampton.
- The Supermarine Aviation Works, Ltd.,
Woolston, Southampton.
- Vickers (Aviation), Ltd.,
Byfleet Road, Weybridge, Surrey.
- Westland Aircraft Works, Ltd.,
Yeovil, Somerset.

DOPE, PAINT AND VARNISH

Enduits, Peintures et Vernis
Adobos, Pinturas y Barnices

- British Celanese, Ltd.,
Celanese House, Hanover Sq., London, W.1.
- Cellon, Ltd.,
Upper Ham Road, Kingston-on-Thames.
- J. Hall & Sons, Ltd.,
Bristol.
- Llewellyn Ryland, Ltd.,
Ballsall Heath Works, Birmingham.
- Nobel Chemical Finishes, Ltd.,
Slough, Bucks.
- Titanine-Emaillite, Ltd.,
Empire House, 175, Piccadilly, London, W.1.

FLYING SCHOOLS

Écoles d'aviation
Escuelas de aviación

- Agra Engineering Co. and Flying School, Ltd.,
Haldon Aerodrome, Teignmouth, S. Devon.
- Airwork, Ltd.,
Heston Aerodrome, Middlesex.
- Brooklands School of Flying, Ltd.,
Brooklands Aerodrome, Byfleet, Surrey.
- De Havilland School of Flying, Ltd.,
Stag Lane Aerodrome, Edgware, Middlesex.
- Henderson Aviation Bureau, Ltd.,
Croydon Aerodrome, Surrey.
- Lancashire School of Aviation, Ltd.,
Squire's Gate, Blackpool.
- Marshall's Flying School, Ltd.,
19, Jesus Lane, Cambridge.
- North Sea Aerial and General Transport, Ltd.,
Brough, East York.
- Northern Air Lines, Ltd.,
Air Port of Manchester, Lancashire.
- Phillips and Powis Aircraft, Ltd.,
Oxford Road, Reading.
- Southern Aircraft, Ltd.,
Shoreham Aerodrome, Sussex.
- Surrey Flying Services, Ltd.,
Croydon Aerodrome, Surrey.

FUEL, OIL AND GREASE

Combustibles, Huiles et Graisses
Combustibles, Aceites y Grasas

- Anglo-American Oil Co., Ltd.,
36, Queen Anne's Gate, Westminster, S.W.1.
- British Petroleum Co., Ltd.,
Britannic House, Moorgate, London, E.C.2.
- W. B. Dick & Sons, Ltd.,
26, Grosvenor Gardens, London, S.W.1.
- A. Duckham & Co., Ltd.,
6, Broad Street Place, London, E.C.3.
- Nationale Benzole Co., Ltd.,
Buckingham Gate, London, S.W.1.
- The Redline Motor Spirit Co., Ltd.,
16, Charles St., London, S.W.1.
- Shell-Mex, Ltd.,
Shell Corner, Kingsway, London, W.C.2.
- Silvertown Lubricants, Ltd.,
Minoco Wharf, London, E.16.
- Tecalemit, Ltd.,
117, Scrubbs Lane, Willesden, London, N.W.1.
- Vacuum Oil Co., Ltd.,
Caxton House, Westminster, London, S.W.1.
- C. C. Wakefield & Co., Ltd.,
Wakefield House, Cheapside, London, E.C.2.

GENERAL ACCESSORIES

Accessoires Généraux
Accesorios en General

- Birmingham Medal Co., Ltd.,
Summerhill Terrace, Parade, Birmingham.
- D. H. Bonnella & Son, Ltd.,
46-48, Osnaburgh Street, London, N.W.1.
- British Russell Parachute Co., Ltd.,
423 & 423a, Edgware Road, London, W.2.
- The Chloride Electrical Storage Co., Ltd.,
Clifton Junction, nr. Manchester.
- Desoutter Bros., Ltd.,
The Hyde, Hendon, London, N.W.9.
- Essex Fire Extinguisher Co., Ltd.,
20-21, Essex Street, Strand, London.
- Irving Air Chute of Great Britain, Ltd.,
Works Road, Letchworth, Herts.
- D. Moseley & Sons,
Ardwick, Manchester.
- The Pyrene Co., Ltd.,
9, Grosvenor Gardens, London, S.W.1.
- Raynold Maps, Ltd.,
Lincoln House, High Holborn, London, W.C.2.
- Reid & Sigrist, Ltd.,
Kingston, Surrey.
- Short & Mason, Ltd.,
Walthamstow, London, E.17.
- Siebe, Gorman & Co., Ltd.,
187, Westminster Bridge Road, London, S.E.1.
- E. Stanford, Ltd.,
12, Long Acre, London, W.C.2.
- Williamson Manufacturing Co., Ltd.,
Litchfield Gardens, London, N.W.10.

GLIDER MANUFACTURERS.

Constructeurs de planeurs
Constructores de planeadores

- E. D. Abbott, Ltd.,
Farnham, Surrey.
- The British Aircraft, Co., Ltd.,
Lower Stone Street, Maidstone, Kent.
- Cloudercraft Glider Co., Ltd.,
Osborne Road, Southampton.
- Cramlington Aircraft Ltd.,
Cramlington, Northumberland.
- Reynard Gliders, Ltd.,
Aylestone, Leicester.
- R.F.D. Co., Ltd.,
17, Stoke Road, Guildford, Surrey.

INSTRUMENTS AND WIRELESS

Instruments et T.S.F.
Instrumentos y T.S.H.

- Accurate Recording Instrument Co., Ltd.,
Teddington, Middlesex.
- The British Instrument Co., Ltd.,
Hendon, London, N.W.9.
- S. G. Brown, Ltd.,
North Acton, London, W.3.
- Kelvin, Bottomley & Baird, Ltd.,
18, Cambridge Street, Glasgow.
- Marconi Telegraph Co., Ltd.,
Marconi House, Strand, London, W.C.2.
- S. Smith & Sons (M.A.), Ltd.,
Cricklewood Works, London, N.W.2.

INSURANCE

Assurances
Seguros

- Bray, Gibb & Co., Ltd.,
166, Piccadilly, London, W.1.
- British Aviation Insurance Group, Ltd.,
78, Cornhill, London, E.C.3.
- Maxton, Graham & Co., Ltd.,
Bush House, London, W.C.2.

METAL SUPPLIERS

Métaux, Fournisseurs de
Metales, Proveedores de

- Acces & Pollock, Ltd.,
Oldbury, Birmingham.
- Aircraft Materials, Ltd.,
Midland Road, London, N.W.1.
- Aluminium (11), Ltd.,
Bush House, Aldwych, London, W.C.2.
- James Booth & Co. (1915), Ltd.,
Argyll Street, Nechells, Birmingham.
- British Aluminium Co., Ltd.,
King William Street, London, E.C.4.
- British Maxium, Ltd.,
Wandsworth, London, S.W.18.
- C. Clifford & Son, Ltd.,
Birmingham.
- Robert W. Coan, Ltd.,
Duncan Street, Islington, London, N.1.
- Thomas Firth & Sons, Ltd.,
Norfolk Works, Sheffield.
- Samuel Fox & Co., Ltd.,
Stocksbridge Works, nr. Sheffield.
- Glacier Metal Co., Ltd.,
Ealing Road, Alperton, Wembley.
- J. J. Habershon & Sons, Ltd.,
Holmes Mills, Rotherham, Yorks.
- Hoyt Metal Co., Ltd.,
Deodar Road, London, S.W.15.
- Kayser, Ellison & Co., Ltd.,
Sheffield.
- W. Mills, Ltd.,
Grove Street, Birmingham.
- Reynolds Tube Co., Ltd.,
Hay Hall Works, Tyseley, Birmingham.

OPERATING COMPANIES

Compagnies de Navigation Aérienne
Compañías de Navegación Aérea

- Alan Cobham Aviation, Ltd.,
150, New Bond Street, London, W.1.
- Aircraft Operating Co., Ltd.,
8, New Square, Lincoln's Inn, London, W.C.2.
- Air Survey Co., Ltd.,
39, Grosvenor Place, London, S.W.1.
- Airwork, Ltd.,
Heston Airpark, Heston, Middlesex.
- Automobile Association,
New Coventry Street, London, W.1.
- Imperial Airways, Ltd.,
Lower Regent Street, London, S.W.1.
- National Flying Services, Ltd.,
Grand Bldgs., Trafalgar Sq., London, S.W.1.

POWER PLANT COMPONENTS

Pièces Détachées pour Moteurs
Componentes para Motores

- AC Sphinx Sparking Plug Co., Ltd.,
Bradford Street, Birmingham.
- Barr & Stroud, Ltd.,
Anniesland, Glasgow.
- British Piston Ring Co., Ltd.,
Holbrook Lane, Coventry.
- British Thomson-Houston Co., Ltd.,
Rugby.
- English Steel Corporation, Ltd.,
Broadway, London, S.W.1.
- Hobdell & Way & Co., Ltd.,
Minories, London, E.1.
- H. M. Hobson, Ltd.,
47, Acton Vale, London, W.3.
- The Hoffmann Manufacturing Co., Ltd.,
Chelmsford, Essex.
- K.L.G. Sparking Plugs, Ltd.,
Putney Vale, London, S.W.15.
- Lodge Plugs, Ltd.,
Rugby.
- Midland Motor Cylinder Co., Ltd.,
Smethwick, Staffs.
- North & Sons, Ltd.,
Whippendell Road, Watford.
- Patent Motor Products, Ltd.,
11, Store Street, London, W.C.1.
- Ransome & Marles Bearing Co., Ltd.,
Newark-on-Trent.
- Rotherham & Sons, Ltd.,
Coventry.
- Simms Motor Units, Ltd.,
Percy Buildings, Rathbone Place, W.1.
- Serck Radiators, Ltd.,
Birmingham.
- Skefko Ball Bearing Co., Ltd.,
Luton, Bedford.
- Specialoid, Ltd.,
Friern Park, North Finchley, N.12.
- Sterling Metals, Ltd.,
Coventry.
- Superflexit, Ltd.,
Slough, Bucks.
- Thompson Bros. (Bilston), Ltd.,
Bradley Engineering Works, Bilston.
- The United Flexible Metallic Tubing Co., Ltd.,
Ponder's End, Middlesex.
- Wellworthy, Ltd.,
Lymington, Hants.
- The Zenith Carburettor Co., Ltd.,
40-42, Newman Street, London, W.1.

TYRES, WHEELS AND BRAKES

Pneus, Roues et Freins
Bandajes, Ruedas y Frenos

- Automotive Products Co., Ltd.,
3, Berners Street, London, W.1.
- Bendix-Perrot Brakes, Ltd.,
Westwood Road, Wilton, Birmingham.
- Dunlop Rubber Co., Ltd.,
Fort Dunlop, Birmingham.
- Goodyear Tyre & Rubber Co. (Gt. Britain), Ltd.,
Wolverhampton.
- The Palmer Tyre, Ltd.,
100-106, Cannon Street, London, E.C.4.

WOOD SUPPLIES

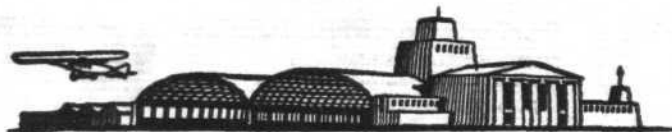
Bois, Fournisseurs de
Maderas, Proveedores de

- Aeronautical & Panel Plywood Co., Ltd.,
218-226, Kingsland Road, London, E.2.
- Louis Bamberger & Co.,
27, Finsbury Square, London, E.C.2.
- W. Mallinson & Son, Ltd.,
130, Hackney Road, London, E.2.
- Nachman, Kremer & Sons, Ltd.,
10, Hill Street, London, E.C.2.

WORKS EQUIPMENT.

Usines, Equipement pour
Fábricas, Equipos para

- Amalgams Co., Ltd.,
186, Attercliffe Road, Sheffield.
- Allen-Liversidge, Ltd.,
Victoria Station House, London, S.W.1.
- Desoutter Bros., Ltd.,
The Hyde, Hendon, N.W.9.
- Essex Fire Extinguisher Co., Ltd.,
20, Essex Street, Strand, London.
- Harvey Frost & Co., Ltd.,
148, Great Portland Street, London, W.1.
- Heenan & Froude, Ltd.,
Worcester.
- Kibray Blow Lamp Co., Ltd.,
196, Great Portland Street, London, W.1.
- The Pyrene Co., Ltd.,
9, Grosvenor Gardens, London, S.W.1.
- Siebe, Gorman & Co., Ltd.,
187, Westminster Bridge Road, London, S.E.1.



AIR TRANSPORT

HANDLEY PAGE TYPE 42

The 42-Seater Flies at Radlett

IT speaks volumes for the confidence felt in the Handley Page firm that Imperial Airways, when deciding to introduce a 42-seater passenger aeroplane on to their Empire services, should have placed an order for eight machines at once without waiting for the first of the type to be produced and tried out. The placing of a production order presumably reduced the cost of each machine, and this is the way in which we may expect orders for aircraft to be placed as a rule in the future. But when we think of the state of affairs a few years ago, such a procedure seems almost extraordinary. At the time of the Aero Exhibition in 1920, for example, no one felt complete confidence that any new machine would perform exactly as the designer hoped that it would do, until it had been actually tried out in the air. Now we have changed all that. A new type with a performance never before attempted in this country, and consequently not the cheapest of aircraft, is ordered, we might almost say, in bulk, because of the confidence felt by the operating firm that the constructors will be able to fulfil their specifications.

A machine which can carry 42 persons—namely, 38 passengers, two pilots, and two attendants—at a cruising speed of upwards of 100 m.p.h. marks a new era in the history of British air transport. Intense public interest has been taken in this new Handley Page from the time when the decision to produce it was first made known. The first of the type has now come into being and has actually flown three times. On Monday, November 17, some representatives of the Press were invited to Radlett aerodrome to witness a flight. Prominent among the spectators was Sir Pierre Van Ryneveld, chief of the South African Air Force. The day was fine and cold but a frost fog hung over the country, and though it did not reach a great height, and did not prevent Capt. Hubert Broad from flying over in a Puss-Moth and landing at Radlett, it was not thought advisable to take the new large machine right up in the air until the visibility conditions had improved. This did not happen until nearly 1 p.m. In the meantime Maj. Cordes and Sqdn.-Ldr. England took the machine for a number of short straight hops, which showed her take-off and landing capabilities and gave some idea of what she looks like in the air.

Naturally this new type looks very unusual. One would not expect it to look ordinary. It seems that in large flying boats it is easy to preserve beauty of line, while in large land-planes the reverse is the case. It is performance and comfort which matter in a new type of this description, not conventional ideas of aesthetics. The fuselage first strikes the eye, holding it bewildered by the unusual length. As the pilot's cockpit, the wireless cabin, and a saloon for 18 passengers are placed in that part of the fuselage which projects in front of the wings, the impression is given of the longest and bluntest nose ever seen on any aeroplane. The two pilots, seated in the front and at the top of this enormous proboscis, must feel very cut off from the wings and from everything else to which they are accustomed in other aeroplanes. Consequently an artificial horizon is provided out in front. The metal sides of the fuselage are corrugated, which adds to rigidity if not to

appearance. The second and larger cabin lies behind the wings, and aft of that the straight lines of the fuselage come to an end. There is a noticeable angle where the rearmost section begins to slope up towards the biplane tail. This angle still further increases the unusual appearance of the machine.

The wings surprise by not looking so unusual as one would have expected them to do. From the passengers' point of view it is an excellent thing to place the root of the lower planes above the windows of the saloon. To gaze down on a wing is not exhilarating, and it sometimes induces a feeling of uneasiness in delicate subjects. One naturally expected that the arrangement by which the lower planes slope down to the level of the necessary gap, and then rise in a dihedral, would be the strangest feature of this very novel aeroplane. But actually it does not look so weird as one would expect. The placing of the two lower Jupiters at the angle in the lower planes tends to take the eye off the strangeness of the said angles. The siting of the engines, however, has nothing of the ordinary about it. Two Jupiters are placed fairly close together in the leading edge of the upper centre section, while the other two are spaced wider apart in the leading edges of the lower planes. The track of the wheels is enormous, and the bent axles of the split undercarriage are impressive by their size and length. The ground clearance seems very small. In fact passengers can step into the saloon without using steps.

The saloons have not yet been furnished, so nothing can be said on the very important point of comfort. We are assured that they will be made as luxurious as modern arts and craft can contrive. Everything will be done to damp out vibration, noise, and other unpleasantnesses, and we may feel sure that the tropical experience of Imperial Airways will see to it that their passengers do not suffer more than need be from the heat of the Arabian desert. No passengers could be carried on Monday; the machine has not yet reached the stage at which that is permissible. In place of them, weights of 1,500 lb. were anchored in each of the saloons. Naturally no great weight of fuel would be put on board, but still the machine was loaded with the equivalent of about 20 passengers. There was no wind to speak of, when Major Cordes opened up the Jupiters and indulged in a series of short straight hops. Later in the day he made a proper flight, circling the aerodrome twice. On each occasion the spectators were astonished by the shortness of the run needed before the great wheels left the ground and the machine took to the air. The landings were also good. The Handley Page type 42 is a very impressive aeroplane.

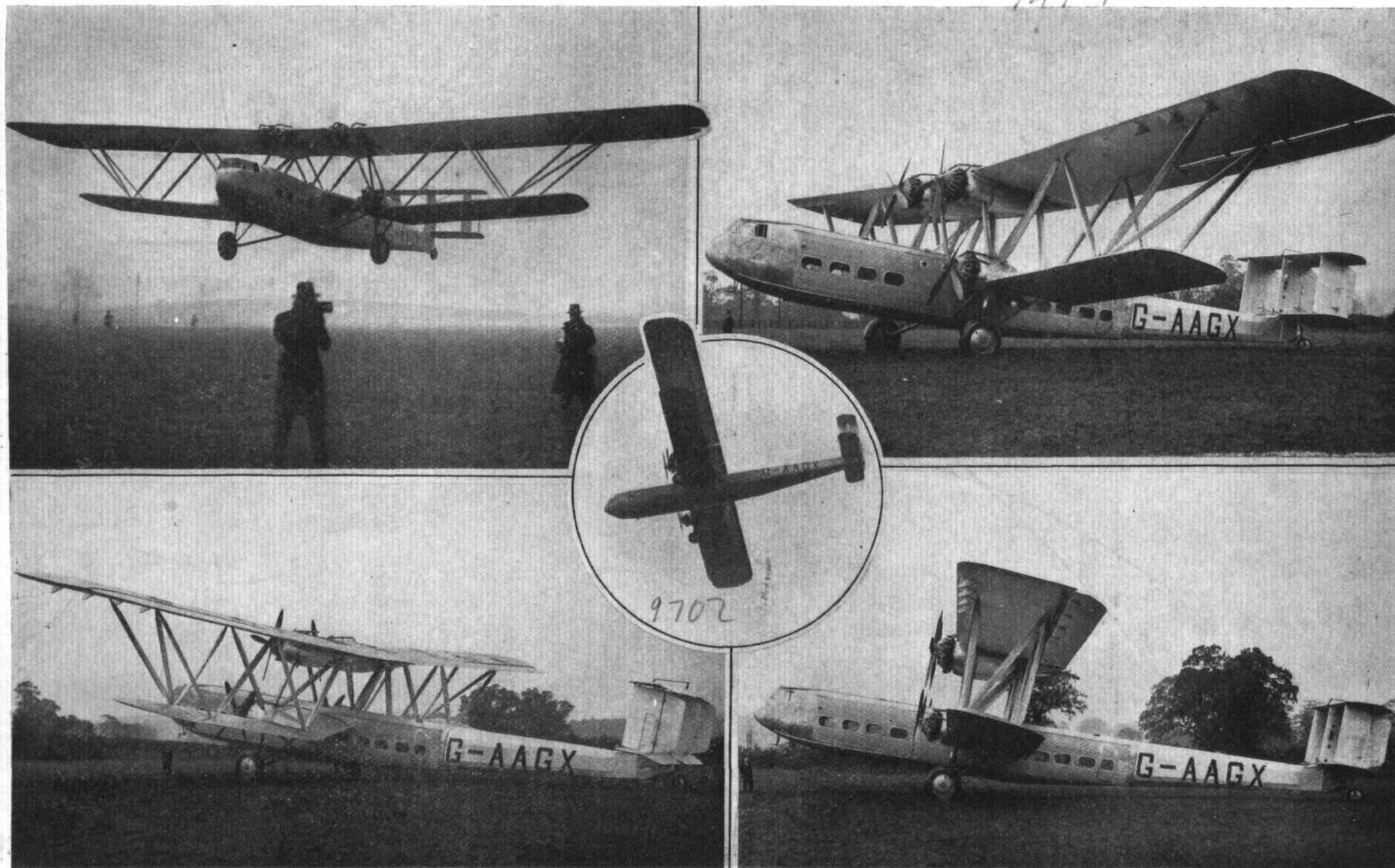
This machine will be produced in two models. One will be known as the European model and will be used to ply between Croydon and the Mediterranean port from which the four-engined Calcuttas will take off for Alexandria. At present this port is Salonika, but it is uncertain what the ultimate arrangements will be. The second model will be known as the Eastern model, and will carry on the service between Cairo and Karachi. May the time be not far distant when every machine leaves Cairo with a full complement of passengers, mails and freight!

Australia-East Indies Air Link Proposed

AN idea has been in the air for some time that when the Dutch should start their air service to the East Indies, it would be possible to arrange for an extension to Australia. Major Norman Brearley, D.S.O., M.C., managing director of West Australia Airways, Ltd., was recently interviewed on the subject in Perth, and is reported to have said that he had discussed the matter with the managing director of the K.L.M.

He stated:—"We hope that a linking up of

our route with the K.L.M. service will take place between Singapore or some point in the Dutch East Indies and our north-west coast, either at Wyndham or Broome. The result would be that the existing well-organised route to the North-West would be able to carry the additional traffic entailed without the extra cost that would be incurred in opening up a new route across Australia. The cost of the operations would probably have to be subsidised by the interested Governments, but the traffic in mails should make the service self-supporting in a comparatively short time."



⁹⁵⁰²
HANDLEY PAGE 42-SEATER: The above photographs show this new large passenger aeroplane on the ground and in the air. In front of the wings is a saloon for 18 passengers while the rear saloon will accommodate 20 more. Machines of this type will be used by Imperial Airways on the routes Croydon-Salonika and Cairo-Karachi. (FLIGHT Photos.) ⁹⁵⁰⁴

THE PRINCE, "DO.X" AND THE SARO "CLOUD"

LAST week we recorded the arrival in England of Germany's giant flying ship "Do.X," and briefly referred to the Prince of Wales' flight in this machine. Now we have to tell of further movements on the part of the "Do.X" and also give our readers some fuller details of the Prince's flight to and from Southampton in the Saro "Cloud," which we hope will prove interesting, and are as follows.

The Saro "Cloud," the largest of the present range of Saunders-Roe amphibian flying boats, left Cowes on the afternoon of the 11th inst. with the permission of the present Canadian owner, Capt. Robert Holt, and piloted by Capt. S. D. Scott, the company's test and development pilot, and arrived after an uneventful journey to Hendon aerodrome ready for the flight to permit the Prince to inspect and fly in the Dornier "Do.X" on the following day.

The departure from Hendon by the Prince's party of eight which, amongst others, included Colonel Piers-Leigh (Equerry to the Prince), Flight-Lieut. Fielden (the Prince's private pilot), Flight-Lieut. Armour and Capt. Baker, the Prince's aircraft instructor, was slightly delayed by fog, which permitted the Prince thoroughly to inspect the Saro "Cloud," in which he was extremely interested.

On leaving Hendon aerodrome, the Prince actually piloted the Saro "Cloud" practically the whole of the way to Calshot, Capt. Scott only taking charge of the quick "take off" and the smooth alighting on Southampton Water alongside the Dornier "Do.X." The Prince remarked that the Saro "Cloud" was different to handle compared to the ordinary light aeroplane, by referring to the unobstructed view obtained from the pilot's seats not giving the usual projecting engine cowling in the field of view, which assisted the novice to trim the machine in the air.

The whole party, including Capt. Scott, who had charge of the journey to and from London, boarded the motor-boat that drew alongside the Saro "Cloud's" companion ladder, and after a reception of officials and officers on the wing root of the Dornier "Do.X," and inspection of that flying boat departed for half an hour's flight over the Isle of Wight.

On the return from this flight, the Prince's party at once reboarded, by motor boat, the Saro "Cloud," and the Prince's exclamation:—"Good Heavens! She's shrunk"



H.R.H. The Prince of Wales inspects the Saro "Cloud" before flying to Calshot to see the "Do.X."

is understandable by referring to the photographs of this amphibian, which illustrates the general similarity of the two machines, which differ in little but wing floats and overall size.

A rapid return was made from Southampton Water by the Saro "Cloud," which landed at the Fairey Aviation Company's aerodrome at West Drayton, Middlesex, owing to the presence of fog again in the London area; the last short stage of the Prince's journey being effected by motor car.

To proceed with the subsequent movements of the "Do.X," she was due to leave Calshot for Bordeaux on November 14, but fog delayed the start until the following morning. Three of the passengers for this trip, Lady Drummond Hay, Mr. Karl von Wiegand and Mr. R. Hartmann, "missed the boat," arriving at Calshot just after the "Do.X" had started, and Capt. H. C. Biard gave chase in a speed boat and jumped on board as the "Do.X" was taxiing along the water. The other passengers on board included Dr. and Mrs. Dornier, Col. the Master of Sempill, Mr. Louis Huck (Managing Director, Dornier Co. of America), Major Gustosa (Italian technical officer supervising the construction of "Do.X" 2



"Do.X" AND THE SARO "CLOUD."—This view showing the "Cloud," with the Prince on board, alighting alongside the "Do.X," illustrates the similarity of these two machines.

and 3, being built for the Royal Italian Air Force), Major Benta (Commandant of the seaplane section, Royal Italian Air Force), Major Krahov (Jugoslav Air Ministry), and Mr. Greville Reach.

Col. the Master of Sempill, one of the passengers on the "Do.X," has kindly furnished us with the following notes concerning the trip to France:—

The wind was nearly due south and the first attempt at taking off was made very much across wind, with the result that it was unsuccessful. The second take-off, at 11.45 p.m., was more into the wind, and she got up all right in about 45-50 sec. She encountered heavy head winds most of the trip, and the course lay to the Channel Islands, the French coast being struck between Alderney and Cape de la Hague. They had been flying along the shore of the Bay of Biscay to a point when some 480 miles had been covered, by which time it was rapidly getting dark and foggy again. In view of the fact that no part of the route ahead was lit, nor was there any lighting arrangement at Gironde, where a landing was to have been made, it was decided to land while there was yet light and to taxi to La Rochelle. This was about 35 miles away and was taxied at about 15 knots on four engines. It was hoped that a pilot would come out and enable them to take the correct channel close in shore but no one did so, and as the channel was narrow, they finally anchored some little way outside La Rochelle. Signalling with the searchlight did not attract anybody's attention and finally Very lights were tried. This brought out an ancient tug, which, after much gesticulation and shouting, was prevented from coming alongside and breaking up things, and induced to send a dinghy across. This was even more ancient than the tug and the passage back proved the most perilous part of the whole trip, those on board having to bale furiously the whole time. In view of the fact that there was no bedding and very little food on board the "Do.X" for the passengers, these all went ashore to La Rochelle, leaving the crew of 15 to sleep on board. The following morning the Préfet immediately came out and welcomed Dr. Dornier very cordially when he discovered who his visitor was. The reports which have been in the daily papers that the "Do.X" was not allowed to enter the harbour were incorrect. The reason that she anchored outside being that they had no pilot and it was deemed safer to remain where they were. During the flight the boat was extremely comfortable and gave a very strong impression of solidity and safety, in fact, it was more like travelling in an airship than in an aircraft,

except for the noise, which, however, was by no means excessive, and conversation in the passengers' quarters could be carried on in normal tones. Up on the bridge she was, of course, much noisier, due to the proximity of the engines, but even there it was not as bad as many normal aircraft. The engines appeared to run extremely smoothly and a speed of about 100 miles an hour was maintained. She was found to be extremely nice to fly and all the controls are very well balanced and light. It was shown the faith the chief pilot had in the controls and their action by his flying for long distances at some 10 ft. above the water, in order to avoid the head wind as much as possible, which, when one realises that every possible precaution is being taken and no risks at all on this flight, speaks very highly for her controllability. Further evidence of the care with which the flight is being carried out was shown by the regular inspection routine which was adhered to. Everything was carried out in accordance with standard naval practice and before starting the flight a complete inspection was made throughout the ship. During the flight there was a regular routine and at any moment one might see a man appearing from the depths of a wing having been down to inspect the aileron or some part of the engine installation. An inspector is carried as part of the crew and he is always on the go. Owing to the length of the leads from the engines to the various instruments in the control room, these are also constantly checked, and one of the mechanics makes his way along the wing on the trolley and telephones back to the control room the reading on the tell-tale instruments which are situated close to the engines, thus enabling a check to be made.

When the "Do.X" failed to arrive at Bordeaux, the French semi-rigid airship, V-10, from the naval station at Rochefort, set out with Com. Pirouse and a crew of five to search for the flying-boat. Owing, it is stated, to a loss of gas, the airship, on the return flight, began to fall and then the keel broke. Although everything possible was jettisoned, the airship crashed into the marshes near Nieulle-sur-Eudou. Fortunately, it did not catch fire, and no one was seriously injured.

The "Do.X" proceeded to Bordeaux on November 15, and was due to leave there, for Corunna and Lisbon, on November 18, but fog again delayed the start. On reaching Lisbon, a decision will be taken as to whether or not an attempt will be made to fly the Atlantic, as the flight will be undertaken only if atmospheric conditions are really good.

CROYDON WEEKLY NOTES

IMPERIAL AIRWAYS completed an interesting piece of work last Wednesday, November 12. Amongst the cargo brought in by the Indian Air Mail were several reels of "talkie" and "movie" pictures of Ras-Tafari's coronation. Within ten minutes of their arrival at Croydon they were transhipped to the D.H.50 and flown by Capt. Walters to Old Sarum, where a fast racing car picked them up and carried them on through the dark to Plymouth. Here they were placed in a speed boat and rushed out to an awaiting liner, outward bound for the States. The pictures were shown in New York cinemas on the evening of Monday, November 17.

The first of the Handley Page forty-seaters for Imperial Airways has flown at Radlett. The remaining seven are following closely behind and Croydon is now looking forward expectantly to their delivery.

We were sorry to part with Messrs. Eggesfield and Prendergast who left on Saturday for the East to pilot the far end of the Indian Air Mail.

Cirrus Aero Engines, Ltd., report brightening prospects. The "Inverted Hermes" is meeting with approval in its demonstrations all over the country and important orders from abroad have already been placed. This news is very welcome in the midst of such a depression.

Unless the "Columbia" crosses the Atlantic yet a third

time we have seen the last of her. Captain Errol Boyd and Lieut. Connor took her from Croydon on November 12, but in the thick Lancashire weather they mistook the pier at Wigan for the docks at Liverpool. She was subsequently shipped to America.

It is with very great regret that we report the death of Mr. A. G. Budd, which took place suddenly on Thursday, when he was visiting his mother on her death-bed. Mr. Budd had been in civil aviation since its inception, first with the Handley Page Air Transport Co., Ltd., and later as representative of Shell petrol and oil at Croydon.

F./O. J. J. Flynn was brought back from Boulogne on Saturday, November 15, by Mr. Dismore of Imperial Airways. He is now in Purley Hospital and making very good progress.

Monday, November 17, was distinctly unpleasant for all travellers, whatever their means of transport. Croydon put up a very fine show of rockets and star shells for two "Argosies," which landed successfully from Brussels and Paris. The other companies were less venturesome and stopped their services nearer the coast, the passengers and freight being brought on by road from Lymington and Penhurst.

The total number of passengers has increased slightly this week to 330 and the 42 tons of freight include 3 tons of gold bullion.

M. L.

R 101 Memorial Service

A MEMORIAL service arranged by the Bedfordshire Province of the Royal Antediluvian Order of Buffaloes in honour of 28 members of their Order who died in the disaster to R 101 took place at the Royal Airship Works, Cardington, on November 16. Members of the Order from all parts of the country attended, including the Grand Primo of England, Brother A. E. Ingle, R.O.H., P.P.G.P., of Manchester, who read the Lesson. The service was attended by civic repre-

sentatives and Mr. S. R. Wells, M.P. for the Bedford Division of Bedfordshire. There was a large attendance of the general public.

The main service was held in No. 2 Shed, in which R 101 lay for some time early this year. A procession then took place to the grave at Cardington Cemetery, where the burial service of the Order was read. Many wreaths were laid on the grave, and upon it the chief officers of the Order dropped single ivy leaves for brotherhood and remembrance.

IN PARLIAMENT

Bombing Practice on Berkshire Downs

MAJOR GLYN, on Nov. 5, asked what decision had been made regarding the purchase of land on the Berkshire Downs, in the vicinity of the White Horse Hill, by the Air Ministry in order to provide an area on which to drop bombs from aeroplanes?

Mr. Montague: It is not now proposed to proceed with the purchase of land.

Airship R 100 Atlantic Flight

MR. MILLS, on November 11, asked the Under-Secretary of State for Air what steps, if any, have been taken to recognise in any way the achievement of the officers and crew of the R 100, whose voyage across the Atlantic and back was achieved against adverse climatic conditions?

Mr. Montague: On the successful conclusion of R 100's Atlantic flight, the officers and crew were received at Cardington by the late Secretary of State for Air, who congratulated them in the warmest terms. Lord Amulree agrees that the flight was a notable achievement for which the officers and crew deserve all credit, but he does not think that in the circumstances recognition of an exceptional kind would be appropriate.

Mr. Mills asked whether the crew of R 100 received any special leave after the double voyage across the Atlantic; and whether any of these men have anything in writing by the Government to produce as proof, in their search for work elsewhere, that they helped to accomplish such a feat?

Mr. Montague: The answer to the first part of the question is in the negative. As regards the second part, no member of the crew has been discharged, but any member who desires will, if and when he leaves, be furnished with a statement that he took part in the flight.

National Flying Services, Ltd.

MR. MONTAGUE, in reply to Mr. Atkinson, said the agreement with National Flying Services, Ltd., does not provide for direct grants in respect of the provision and maintenance of aerodromes. It provides for grants in respect of club members who qualify for pilots' licences, but any such grants after the first three years are subject to the condition that a stipulated number of aerodromes and landing grounds must have been provided within that period. The total amount paid to National Flying Services, Ltd., up to September 30 last was £2,770, of which sum £2,500 represents an advance at interest made on July 31 in anticipation of future grants to be earned under the agreement. Claims for grants amounting to about £1,100 have since been put forward by the company. No further advances are in contemplation.

Air-Mail Service Calcutta-Rangoon

MAJOR GRAHAM POLE asked the Secretary of State for India if he will give information showing the progress that has been made in the preparations for the extension of the air-mail service to Calcutta and Rangoon.

Mr. Benn, on November 10, in reply to Major Graham Pole said, the ground organisation between Karachi and Calcutta for the extension of the air-mail service to Calcutta and Rangoon, is now complete, or practically so. Work is in progress on the ground organisation between Calcutta and Rangoon, and is expected to be completed by the end of October, 1931.

Trans-Atlantic Flight, "Miss Columbia"

CAPTAIN HAROLD BALFOUR, on November 12, asked the Under-Secretary of State for Air if he is aware that a Royal Air Force flying boat proceeded from Mount Batten to the Scilly Isles for the purpose of transporting petrol to the aeroplane *Miss Columbia* on its recent trans-Atlantic flight; and if he will state the cost of this voyage?

Mr. Montague: Yes, petrol was supplied to this American aeroplane, as stated in the question, and the cost has since been refunded to the Air Ministry. No special expenditure was incurred, as the flying boat was, in any case, due for a navigational exercise that day, and the opportunity was

taken to carry out some photographic work at Penzance and the Scilly Islands, an occasion for which was already being awaited.

Light Aeroplane Clubs

MR. MONTAGUE, in reply to Mr. Day, said the number of new "A" pilot's licences issued to members of subsidised light aeroplane clubs during the year ended July 31, 1930, was 441. The names of the clubs and the numbers of new licences issued to the members of each club are as follows:—Bristol and Wessex, 20; Cinque Ports, 38; Hampshire, 44; Lancashire, 26; Liverpool and District, 23; London, 47; Midland, 28; Newcastle, 33; Norfolk and Norwich, 15; Northamptonshire, 7; Nottingham, 3; Scottish, 21; Suffolk and Eastern Counties, 12; Yorkshire, 17; Clubs affiliated to National Flying Services, Limited, 107. Total, 441.

Sea-Going Aeroplanes

SIR RENNELL ROBB asked the Under-Secretary of State for Air (1) whether, in view of the fact that at the naval demonstration on November 1 an all-metal machine which was compelled to make a forced landing on the sea sank immediately after touching the water, that an all-metal non-buoyant type of machine is the only one used at sea by this country for long-ranging reconnaissance flights up to 100 miles from the parent ship, and that such machines have never been known to remain afloat for more than three minutes, he will consider the resumption for use in such long-distance flights of machines with a wooden fuselage and air bags in the tail which have a buoyancy of two or three hours in fair weather; (2) whether a rubber raft, which requires time for detachment and inflation, such as is furnished to all-metal machines, has been subjected to practical tests as a life-saving device in non-buoyant aircraft at sea; and, if so, with what results?

Mr. Montague: A life-saving collapsible dinghy, which can be very rapidly inflated by mechanical means, has recently been subjected to practical tests with satisfactory results, and will be carried by all sea-going aeroplanes which are large enough to be so equipped. I am advised that the re-introduction of wooden construction would be a somewhat retrograde step; but action is being taken to improve the buoyancy of all aircraft operating from aircraft carriers, and all-metal sea-going aircraft, at least up to the standard—two or three hours' buoyancy.

Airworthiness and Flutter

MR. MONTAGUE, in reply to Capt. Macdonald, said cases of wing, aileron or tail flutter have been reported in different types of aircraft, mostly experimental, from time to time. If such flutter has proved to be incurable, the type has not been adopted for Service or civil use. One obsolescent type of Service aircraft which is potentially liable to flutter at extreme speeds is permitted to be flown only at speeds at which flutter does not in fact occur. No flutter is known to occur in any aircraft now holding a British certificate of airworthiness.

Airships' Engines, Weight

MR. MONTAGUE, in reply to Sir W. Brass, said the total weight of the petrol engines (with reversing gears) installed in R 100 is 10,424 lb., whilst that of the heavy oil engines in R 101 was 23,900 lb., giving approximate weights per horse-power of 2.9 lb. and 7.96 lb. respectively. The greater weight of the heavy-oil engine is, however, more than counterbalanced on a long flight by its smaller fuel consumption.

Royal Air Force and Instruction to Foreign Officers

MR. MONTAGUE, in reply to Sir N. Grattan Doyle, said there are 37 foreign officers at present receiving instruction in Royal Air Force establishments, and the countries from which they come are:—Belgium 1, Chile 1, Egypt 7, Estonia 1, Greece 6, Iraq 14, Japan 2, Latvia 1, Mexico 1, Siam 2, Sweden 1. Total 37.

AIR MINISTRY NOTICES TO AIRMEN

AIR MINISTRY NOTICES TO AIRMEN

Danger Area: Erection of High Mast on Romney Marsh

A STEEL mast, 156 ft. high, has been erected on Romney Marsh in the following position: Lat. 51 deg. 03 min. N., Long. 0 deg. 56 min. E. 183 yards S.W. of Newchurch church, 2½ miles N.W. of Littlestone landing ground, and 4½ miles S.W. by W. of Lympne air port. Aircraft should avoid flying low in the vicinity of the mast, which is unmarked at present.

Navigational Warning (No. 23 of 1930).

- A.—Flights Across the Strait of Dover: Amendment
- B.—Iraq: Overhead Wires Across Rivers: Amendment
- C.—List of Cancelled Notices

A.—Flights Across the Strait of Dover

A signal of acknowledgment in the form of a white panel on a black background having been installed at Calais semaphore station, N/A General Notice No. 16 of 1930, is amended as follows:—

Para. 1 (b) —

Sub-section (ii) —

Amend the first paragraph to read "The aircraft must continue to circle at a reporting point (except, at present, at Alprech) until . . . personnel."

Amend the N.B. at the end of the sub-section to read as follows:—
N.B.—The panel at Alprech is at present in course of installation. Pending completion, therefore, no signal of acknowledgment will be given at this point.

Sub-section (v) —

Amend lines 16–18 of the sub-section to read as follows:—
Similarly, circuits must always be continued until the signal of acknowledgment has been received except, at present, at Alprech. See para. 1 (b) (ii) above.

Para. 2 (c) —

Amend the reference in line 4 to read "in para. 2 (b)."

B.—Iraq: Overhead Wires Across Rivers

N/A General Notice No. 26 of 1930 is amended as follows:—

Para. 1, line 1 —

Amend "20 feet" to read "120 feet."

C.—List of Cancelled Notices

The following Notices have been cancelled since the issue of General Notice No. 1 of 1930 and Navigational Warning No. 1 of 1930 respectively, or are cancelled hereby:—

Navigational Warnings, 1930

Reprints Nos. 2, 3 and 4 of N/W. No. 1, and Notices Nos. 2-4, 5*, 6-10, 12-17, 18*, 19 and 21.

General Notices, 1930

Reprint No. 27 of G/N. No. 1, and Notices Nos. 5*, 6, 10, 14, 15, 18, 19, 20*, 21, 22*, 24 and 25 (para. 3*).

General Notice (No. 29 of 1930)

* Cancelled by incorporation in the Air Pilot (Volume I) or the Monthly Supplements thereto.

AIR MINISTRY NOTICE TO AIRCRAFT OWNERS AND GROUND ENGINEERS

Repair of Civil Aircraft Abroad

1. THE Air Navigation Directions (A.N.D.7), Sect. V, sets out the requirements, in connection with the repair or overhaul of an aircraft, which must be complied with if the aircraft in question is to retain its British certificate of airworthiness.

2. Occasions may arise when it may be necessary to effect in a foreign country repairs to, or an overhaul of, a British aircraft. On such occasions the following procedure will apply.

3. It must be established:—

(a) That the work of repair or overhaul is carried out to drawings which are identical with those on which the type approval is based.

(b) That the materials used in this work are equal to those authorised for the type design.

(c) That approved inspection of the work of repair or overhaul is carried out and is properly certified.

4. With regard to 3 (a) and (b) it may happen that the company or individual doing the work may be able to obtain the required drawings from the "parent" firm (i.e., the constructors of the aircraft), or they may prepare, from other available data, drawings and/or specifications which could be submitted to the parent firm for consideration. The requirements under these headings will be satisfied only when the company doing the work has submitted to the parent firm a certified list of the drawings used (if these are known drawings), or copies of the drawings and/or specifications (if these are not known to the parent firm), and when the parent firm has certified that these drawings and/or specifications are in all essential respects similar to those approved for the type aircraft.

With regard to 3(c) the requirements will be met when the work has been inspected and certified by a recognised Inspection Authority.

5. When any British aircraft has been repaired or overhauled abroad, the existing certificate of airworthiness will remain valid only when the certificates as to drawings, specifications, and workmanship mentioned in the preceding paragraph have been obtained. Further, these certificates must be produced for examination by the Inspector on the occasion of the inspection of the aircraft for the next renewal of its certificate of airworthiness.

(No. 36 of 1930.)

TESTING AEROPLANE CONTROLS

By H. L. STEVENS

(Concluded from page 1251)

Control at the Stall

RETURNING to control at the stall, I must go very briefly over ground that has been covered before. Why does an aeroplane become an altogether different thing laterally when flown too slow? Referring to the ordinary lift and drag curves, the lift curve is seen to consist of an almost straight rising portion, a fairly sharp maximum followed by a portion of reversed slope. The drag curve starts horizontally and continues with a slope getting steeper as the incidence increases. Now imagine the aeroplane rolling so that the port wing is going down and the starboard wing rising. The incidence of the port wing is relatively increased as it is falling towards the air flow and that of the starboard is reduced as it is rising away from the flow. Below the stall this gives an increased lift on the port side and a decreased lift on the starboard side, tending to stop the motion. There is also an increase of drag on the port side and a decrease to starboard which tends to turn the aeroplane towards the lower wing. But above the stall the lift effect is reversed and the drag effect largely increased, consequently the roll tends to increase and the turning effect is also increased, resulting in a violent rolling turn or the beginning of a spin.

Now consider the effect of ailerons at the stall, first, without any rolling action. Small downward movements are seen to give a small increase of lift, but large downwards movements may even lead to a loss of lift. Upward movements always give a reduction in lift. Downward movements give a large increase in drag and upward movements a large reduction. Consequently, although the initial response may be in the right direction it is immediately overcome by the roll due to the turn and the aeroplane ends by rolling against the ailerons.

If the ailerons are used against a roll already developed the result is worse still as larger incidences have already been reached on the wing and it is desired to rise.

One cure for this state of affairs that suggests itself is to produce a wing whose lift curve, instead of dropping after the stall, runs along horizontally. This method has been used with varying effect. It is possible to get lateral stability this way, but to get control is much more difficult as this flat top property is a characteristic of low lift sections and as soon as the ailerons are used one side becomes a relatively high lift section and the flat top property is likely to be lost.

The obvious cure is to arrange that the wing tips do not stall until long after the rest of the aeroplane. The well-known slot in its various forms is an example of this. Washed out wing tips and tips of different section from the rest of the plane are other ideas. Again, the ailerons may be used differentially, the up going one moving much more than the down; an extreme case of this is control by moving the ailerons up only. Floating ailerons or wing tips can be used; this is a kind of variable wash out. Wing tip shape may be important. I think the trailing edge should always be shorter than the leading edge.

All these devices, except the slot, lead to loss of lift which is not wanted when landing. If the slot is pushed to its logical conclusion, the aircraft becomes slotted all over and then some extra device is wanted at the tips and we have the interceptor. This, again, is in the class where control is obtained at the expense of lift and by the time we have slots cum ailerons cum interceptors the aeroplane is getting rather a Christmas tree.

One other method that has been used is to reduce the longitudinal control until the aeroplane cannot quite be stalled without a yank, at the same using a wing section of low drag at the stall. This results in the attitude near the stall being very much nose up. Consequently, the pilot gets a very good warning of impending stall and is also able to make a three-point landing without actually stalling but at a speed very little in excess of the stalling speed.

Strange forms of lateral control have also been tried, but they usually seem to result in a snatchy non-progressive result.

Spinning

Two forms of spin are indulged in, the short and the prolonged.

The short spin is one of two or three turns, it is often used first one way and then the other to relieve the tedium of a long descent. The flick stalled turn used in fighting is really

a case of the short spin. The short spin may also be got into accidentally in clouds. Recovery should take not more than half to one turn and preferably should occur with controls abandoned and the aeroplane given its head.

The prolonged spin is one of from six to eight turns. It is of doubtful value, but it may be got into accidentally. Aircraft likely to do it are put through this test at Martlesham to make sure they are O.K. before going to service. Recovery should take place in not more than three turns, controls may be reversed, but preliminary centralisation must not lead to a spin from which subsequent reversal takes a long time to stop the spin. Such a condition has been found on one or two occasions.

The cure for difficulty in getting out of a spin is increased or better disposed fin area. Deepening the fuselage at the rear and leading it to a vertical knife edge has a similar effect. A good long fuselage to start with is a valuable insurance against this trouble.

Diving

The aeroplane must be a steady gun platform on a dive and must not require large forces to dive it. This involves roughly neutral stability at high speeds and accurate lateral trim which, in turn, involves wings stiff in torsion.

If the aeroplane is unstable fore and aft, it will hunt, or the forces to pull out will increase so rapidly that recovery is difficult.

If it is out of lateral trim, it will develop a corkscrew motion in the dive that cannot be controlled. Careful design of rudder balance is also necessary to prevent directional hunting.

Testing

Now here we enter on a regular battle ground, at any rate as far as Martlesham Heath is concerned. At present, our reports on general handling are based on opinions only, although admittedly expert opinions. They are not backed up by any measurements to show how good or how bad an aeroplane is. Words such as heavy, sloppy, spongy, appear instead of nice concise figures such as the minimum turning circle is of 100 yards diameter and can be encompassed at 140 m.p.h. using a force of 7.5 lb. The aeroplane can be brought from a 60 deg. bank to port to a 60 deg. bank to starboard in 4.5 secs. at a speed of 150 m.p.h. with a force of 15 lb. Also we are told that our opinions change. Well, I hope they do. If aeroplanes did not improve and standards become higher, it would be a poor outlook for the aeronautical industry.

When we have several aeroplanes built to the same specification in competition I think Martlesham can be relied on to say which is the best on controls, and even if we had figures such as I have suggested above, or could allot a system of marks for control features, we should still be in a difficulty, for the best aeroplane on controls may not be the best in performance. How are we to fix the relative value of the two? It will still be a matter of opinion whether 100 marks for control and 90 for performance is better than 90 for control and 100 for performance.

Our main job is to assist the Air Ministry to get the best aircraft into the Service and to get them there quickly. If two aircraft out of a bunch are both good, each excelling the other in some features, they will probably both go to service trials, and the final decision may depend on such things as robustness of construction or ease of maintenance.

I have an idea that it might assist the aircraft industry generally if the contractors' pilots were all allowed to fly the winner of a competition. They would then have a better idea of the standard aimed at.

There are three distinct points of view about this question of measurement:—

(1) From the Air Ministry point of view, if they are satisfied that they are getting the best aircraft without figures, they won't want us to spend extra time getting figures.

(2) From the contractor's point of view, figures are desirable as giving them a standard to work to.

(3) From the research point of view, figures are essential, but Martlesham is not necessarily the place to get them.

Everybody would like figures if they could have them without holding up tests. It must be remembered that Martlesham forwards about 400 reports a year. Admittedly, many of them are very short, some just single pages and a

photograph, but even those take time in examination, etc., to prepare; hence, any increase in the work per aircraft must have big advantages if it is to be adopted. Extra staff is no solution, as you can only do one test at a time on each aircraft.

However, let us assume that we are going to give definite measurements; what can we measure? The things to be measured must be such that a large or small value of them definitely means a good aircraft. It is no good sending up a lot of figures if the winner on points is not the best aircraft, after all.

Please do not think I am decrying the value of figures; I realise as much as anyone the difficulties of a system under which an aircraft which has cost a lot of money to build and is somebody's child, is turned down on what the father may think the inadequate opinion unsupported by facts of a few pilots.

So we have been looking round for things to measure and means to measure them, bearing in mind that the things we measure must not involve extra flying and the means to measure them must be fitted in five minutes.

Consider the problem under three heads:—(1) Control at the stall; this includes spinning. (2) Fighting manœuvres. (3) Control in normal flight.

Improvement in (1) means safety from vicious aircraft.

Improvement in (2) means safety from vicious enemies.

Improvement in (3) is a matter of comfort only, and therefore is relatively of less importance. Hence, as there is only a limited amount of time and money available, attention should be concentrated on (1), and (2) and (3) should be left to the contractors themselves.

Control at the Stall

Here we are looking for the danger of starting an accidental spin and for any difficulty in recovery from short or prolonged intentional spins.

Tests Tried

(1) *Tyros Take-off*.—This test was used with some success in a competition for training aircraft. The aeroplane is flown on a steady climb, the engine is cut off and the aeroplane turned with the nose still well up, the idea, of course, being to simulate the effect of engine failure taking off, followed by an attempt to return to the aerodrome. This test yields no figures but gives some valuable facts about the aircraft.

(2) *Stalled Glide*.—The aeroplane is held as steadily as possible for one minute with the tail setting at the negative limit, stick right back, engine off. A recording A.S.I. is carried, and the fluctuations in the record give some idea of controllability in the stalled state. Here we have actual figures of some value.

(3) *Sustained Spins*.—The C. of G. of the aircraft is adjusted to the back limit for the final test in this series. The tail is set right back, the engine cut off, and at least eight turns of a spin carried out. The pilot then endeavours to recover, first by centralising the controls and by reversing them. The important figure obtained in this test is the number of turns required to recover. We also obtain the height drop in the spin and during the recovery and the time for each turn. A recording accelerometer is also carried, and its record may be of considerable value in the case of difficulty in recovery.

Fighting Manœuvres

At the moment we have here opinions only, though we carry accelerometers on these tests also and some use may be made of the records. Mock flights are sometimes carried out, interchanging pilots. The value of control at the stall and also of low loading is shown up in these tests.

It is possible that in the near future we may be able to give actual figures for the smallest turning circle, the minimum time to complete a figure of eight, and the forces that have to be exerted at different speeds.

Equipment Available

There is any amount of equipment available in the way of measuring instruments, but most of them take a considerable amount of work and time to fit.

Force-Measuring Devices

(1) *Force-Measuring Stick*.—This takes the form of a spring knob that can be attached to the stick. It reads directly the force exerted in one direction. It is easy to fit, but something giving a continuous record would be better; hence we have:—

(2) *Force-Recording Stick*.—This gives a continuous record of forces in both directions, but is very much harder to fit,

especially in the more modern aircraft whose cockpits are already sufficiently crowded.

(3) *Force-Recording Rudder Bar*.—Gives a continuous record of the force on the rudder bar and is even harder to fit.

(4) *Control Wire Force Indicators and Recorders*.—These have been developed to provide something which could be inserted in a control wire, taking the place of the ordinary turnbuckle, and therefore being easy to fit. They are of two forms; in the simplest an indicator is moved and stays put at the maximum force recorded, the other form is a recorder. So far they have not been successful. The simple form is difficult to interpret, and the take-off and landing forces are often found to be greater than those obtained in the air. The recording form at present has too much friction. Some line such as this seems, however, to be the correct one if records of forces are to be obtained by testing stations.

Devices for Measuring the Flight Path

(1) *Accelerometer*.—This instrument takes a continuous record of the air force acting on the aeroplane perpendicular to a given plane, and therefore of the accelerations in the same direction. This is easy to fit, often used, and provides data.

(2) *Rate of Turn Recorder*.—This is a very complicated apparatus. It consists of a windmill-driven generator supplying current to three gyros with axes mutually at right angles. The precessional forces of these gyros compress springs and provide a record of the rates of turn about all three axes. Essentially a research instrument, and a very valuable one. Has been used in investigations on spinning and control at low speeds.

(3) *Camera Obscura*.—This enables a ground observer to plot the path in space of an aircraft. Not much used at present.

(4) *Cinema Cameras*.—These have been used in various forms: operating from the ground and photographing the aircraft; carried by another aircraft and photographing a following aircraft; carried on the aircraft itself and photographing the sun, the horizon, or the ground.

Devices for Measuring Control Angles

(1) *Simple Measuring Devices*.—These have taken the form of pointers in the cockpit, or in the case of ailerons out on the wings which move in unison with the control surfaces. These are intended for steady flight rather than for manœuvring.

(2) *Recorders*.—Wind or electrical-driven devices which can be fixed on wing, tail-plane or fin, and take a continuous record of the movements of the control surface. These are not easy to fit, though one feels they ought to be. They have been much used for research, particularly on control at low speeds.

Synchronising Devices

These are necessary to enable one to correlate the records from the instruments mentioned above. As these instruments are usually optically recording by means of electric light, the synchronising device takes the form of a windmill-driven clock that interrupts the records at regular time intervals.

This list will show that there is no lack of equipment and most of it is in daily use at the research establishments. A set of figures from one of the reports on control at low speeds will show the uses to which it can be put. Nearly all of it, however, suffers from the disadvantage that it takes a long time to install, cannot therefore be transferred quickly from aircraft to aircraft, and requires the services of an expert to look after it. Hence, we must have something simpler for testing stations.

I think the maximum amount of information we can expect to get in the course of type trials is as follows:—

(1) General opinion of three or four pilots used to the particular class under test.

(2) Accelerometer records in handling and fighting trials, also in spins, in which, in addition, the turns and height drop both in the spin and to recover will be observed.

(3) Actual measurements with a camera obscura and maximum control wire force indicators of some manœuvres such as a figure of eight, giving the time to perform the manœuvre and the maximum force required.

Lessons from Experience

This lecture would be incomplete without an endeavour to record any lessons one has learnt from testing controls and analysing the reports of others.

(1) Controls must be harmonised.

(2) Friction should not be tolerated, except perhaps in the rudder controls, and not there if it can be avoided by other means.

(3) Small chord controls down to 30 per cent. are adequate for ailerons, 35 per cent. for elevators, and 40 per cent. for rudders.

(4) It is better to have ailerons on all four planes.

(5) A long fuselage is an insurance against many troubles. The American rule that the tail organs should be outside the circle containing the wings is a very sound one.

(6) Fins and rudders must not be blanked by the fuselage at large angles of incidence.

(7) With ailerons balanced by the set-back hinges, 35 per cent. balance can be used if the nose is symmetrical and 25 per cent. if it is of the Frise shape. Rigging down the ailerons makes the Frise type heavier and the symmetrical type lighter.

(8) A plain open slot gives lateral stability at the stall. A slot coupled to the aileron and working from the closed position gives control at the stall, but not stability. The latter arrangement working from the open position should give stability and control, but has been disappointing in practice.

(9) The slot-cum-aileron-cum-interceptor does almost all one wants but is getting too complicated. We want to evolve something new altogether, but it must work smoothly.

(10) Some aircraft without slots do not drop a wing at the stall, and this property seems to be a function of wing section and tip shape. The flat-topped lift curve produces this effect on some aircraft, but not on others.

(11) Slots are not a cure for the flat spin.

Conclusion

To sum up, there are three kinds of testing: (1) research; (2) competition; (3) development.

Research on controls is, I think, largely developed to the end of finding out how nearly model and full-scale aeroplane agree. Given all the properties of a model, the expert mathematician can predict what it will do under all circumstances and what forces are required to make it do anything. All the properties, however, involve such an enormous mass of measurements that research also has to be directed to finding out how few are essential and how many we can do without.

Competition.—When we have several aircraft to the same specification in competition, we merely have to choose the best. This, I think, can safely be left to the opinion of expert pilots.

Development.—Here we are concerned with how to improve aircraft. In a competition we find the best, and in order to perpetuate its properties in other types we must find out why it is the best. To do this, we must find out what pilots do with it, what forces they use, and how it responds. We must note in what respects the best aircraft differs from those that are not so good, and then we go back to research to find out how to make the best better still.

Finally, I must again call attention to the fact that any opinions I have expressed are entirely my own. In such a controversial subject I can hardly expect that they will be generally concurred in, but I hope they will result in others with more experience coming forward to join in the discussion.

CORRESPONDENCE

[The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.]

FORWARD ELEVATORS FOR AIRSHIPS

[2349]. With reference to the question of forward elevators in airships, it is interesting to recall that Naval Airship No. 1, which was built under the supervision of a submarine officer, was fitted with these for the purposes indicated by your correspondent. It was found, however, that elevators forward necessitated larger control surfaces aft, to give adequate stability, thus increasing weight.

In the second Naval Airship, and in the whole of the R 23 class, the same object was obtained by fitting swivelling propellers forward, which not only functioned as forward elevators, but made the ship much more controllable in other ways, and were really essential for low flying, *i.e.*, within three ships' length of the ground. The Germans did not find swivelling propellers necessary during the war, as their object was to fly as high as possible, where it is less bumpy than lower down, and where a dive of 2,000 ft. would be of no consequence. When the German L 33 made an emergency landing at Little Wigborough (as R 101 seems to have nearly succeeded in doing in France), we copied that design throughout, and all subsequent rigid airships have been based on it. How satisfactory it was for its intended purpose is well known. That design was never intended for low flying over land, in hot climates, and where conditions are much bumpier than over the sea, and low flying is essential to the commercial airship if it is to carry a paying load.

R 100 and R 101 should, therefore, have been fitted with swivelling propellers, but those responsible for their design had no experience in the matter, and therefore could not be expected to depart from the successful war-time Zeppelin practice.

I do not consider that the omission of forward control caused the loss of R 101, the weather conditions do not seem to have been bad enough for that. In the case of the Shenandoah, swivelling propellers would probably have saved the ship, and it is interesting to note that the new American airships are to be so fitted. In the case of R 101, I believe the primary cause of the accident was a faulty electric circuit in the hotel arrangements inside (where they should never have been), and not from any inherent defect in the airship *per se*.

F. L. N. BOOTHBY,
Capt. R.N. (Retd.)

Cowes, I.W.,
November 17, 1930.

CIVIL FLYING IN IRELAND

[2350]. I have been a regular reader of your very popular journal now for quite a good few years, and I am always very keen to see some advance being made with civil flying here in Ireland. I hear now that the Department of Industry and Commerce, Irish Free State, have made a start in the issue of "A" licences; these, I understand, are printed in different languages—one in English, the other Gaelic. So with your permission, Mr. Editor, I would like to offer congratulations to the first two members of the Irish Aero Club who have just passed their tests at Baldonnel. I would also have liked to see a resumé of this club's activities published in your valuable paper, such as how the old Avian Bus is going along, as well as how the members like their new Gipsy Moth. I haven't seen it much in the air since it was taken out of the band-box, and I hear quite a few are anxious to try it, so it's a case of one waiting on the other to ask to try it.

I would also like to know who proposed December 13 for the flip to Cork and back. Try again, Mr. Birdman.

The new club, the Iona National Flying School, seems to be determined on getting the folk air-minded throughout the Irish Free State, judging by the recent descents on such places as the Curragh, Drogheda, Waterford, and Killaloe. The last-mentioned place is very watery, Mr. Tindall; don't get your tootsies wet. The lake there is very fascinating, I hear. And as for Drogheda, Mr. Malone must certainly have virtually thousands of friends, if one judges by numbers, and he should get a good few members for the club there. Personally, I like the Mornington Ghosts; they are a treat. They are all working very hard down there for the day when the Ghosts will have their honeymoons in the Desoutter; they are keen on that "bus." And next time bring the parachute jumper too; they say advertising pays.

However, Mr. Cahill and the other gentlemen are certainly doing men's parts to advance civil aviation here, so hurry with your pupils, Mr. Tindall, till we see them all armed with their spanking new "A" certificates, and I wish all the best of luck and success.

Thanking you, Mr. Editor, for taking up valuable space.
OBSERVER.

Dublin.
November 11, 1930.

[We would be only too pleased to receive reports from the Irish Flying Clubs for publication in FLIGHT. Will club secretaries please note?—Ed.]

THE ROYAL AIR FORCE

London Gazette, November 11, 1930.

General Duties Branch

Flying Officer K. R. Warton (R.A.F.O.) is granted a short-service commn. as Pilot Officer on probation with effect from and with seny. of Oct. 28; Lt.-Cdr. E. W. Anstice, R.N., is reattached to R.A.F. as a Flight Lt. with effect from Nov. 4, and with seny. of July 1, 1927. The follg. Pilot Officers on probation are confirmed in rank:—N. Hill (Oct. 16); D. E. Milson (Oct. 20).

The follg. Pilot Officers are promoted to rank of Flying Officer (Oct. 13):—W. K. Brett, K. D. Knocker, P. R. May, V. B. Myers, N. C. Singer. The follg. are restored to full pay from half-pay:—Group Capt. R. E. C. Peirse, D.S.O., A.F.C., (Nov. 7); Flight Lt. G. R. Beamish (Nov. 1).

Flight Lt. C. W. Hill is placed on half-pay list, scale B. (Nov. 11); Flying Officer I. B. Beesley relinquishes his short service commn. on account of ill-health (Nov. 12); Pilot Officer on probation C. B. Smith relinquishes his short-service commn. on account of ill-health (Nov. 22).

Medical Branch

Flying Officer N. M. Jerram, M.R.C.S., L.R.C.P., is promoted to rank of Flight Lt. (April 2) (substituted for *Gazette*, Oct. 24).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Group Captain J. R. W. Smyth-Pigott, D.S.O., to H.Q., Air Defence of Gt. Britain, Uxbridge, for duty as Chief Staff Officer, 30.10.30.

Wing Commander D. L. Allen, A.F.C., to Half-pay List, 1.11.30.

Squadron-Leaders: T. P. Y. Moore, to Half-pay List, 30.10.30. L. G. S. Payne, M.C., A.F.C., to H.Q., Coastal Area, 29.10.30. C. T. Anderson, D.F.C., to Air Ministry (D.O.I.), 27.10.30. G. D. Nelson, D.S.C., A.F.C., to R.A.F. Depot, Uxbridge, 1.11.30.

Flight-Lieutenants: R. E. M. B. Milne, to R.A.F. Depot, Uxbridge, 27.10.30. A. W. Bates, to No. 23 Group H.Q., Grantham, 1.11.30. A. H. J. Howlett, to No. 100 Squadron, Donibristle, 27.10.30. A. P. K. Hattersley, to R.A.F. Depot, Uxbridge, 12.10.30. G. Lansdowne, D.F.C., to R.A.F. Depot,

Paris International Aero Show

THE XIIth International Aeronautical Exhibition will begin on November 28; it will be held, as usual, in Paris, at the Grand Palais. Installations are now being completed, and the show may be looked forward to as a real success. It is interesting to point out that only new types of aeroplanes will be exhibited; every country will show light aircraft, thus illustrating general tendencies towards private flying. The following British firms will be exhibiting at the Paris Show:—Armstrong-Whitworth Aircraft, Ltd., Boulton and Paul, Ltd., Bristol Aeroplane Co., Ltd., Chance Bros. & Co., Ltd., De Havilland Aircraft Co., Ltd., Rolls-Royce, Ltd., Vickers, Ltd., and possibly Handley-Page, Ltd.

When is a Fokker not a Fokker?

The answer is, "When it is a Ford." In our article on the three-engined Ford monoplanes in last week's issue of *FLIGHT*, the writer of the article, as a result of some mental aberration, twice wrote "Fokker tri-motor," instead of "Ford tri-motor." The slip was one of those perfectly unaccountable ones which, in spite of every care, do occur now and again. Readers who noticed the mistake were probably perfectly aware that Ford was meant, as there was no reason whatever for mentioning the name Fokker in connection with that particular article. We apologise for the mistake, and would ask readers who wish to have their copies accurate to make the necessary corrections.

The Model Radial Aero Engine

LAST week we illustrated a very interesting model radial aero engine constructed by Mr. Gerald Smith. In the caption to this illustration, however, we, unfortunately, jumped to a false conclusion—stating that the model was one of the Armstrong Siddeley "Jaguar." We now learn that this little engine is Mr. Smith's original design, and differs from the Armstrong Siddeley engine in several details. It must be admitted that we did not examine the photograph—which was sent in to us by Armstrong Siddeley Motors, Ltd.—very carefully, and not having had the pleasure of seeing this excellent model "in the flesh," we committed our error on a previous impression that it was a miniature in general of the famous "A.S." engine.

A Desoutter Announcement

OUR readers, like ourselves, will be very pleased to learn that, on the authority of Mr. Desoutter himself, the statement that he was closing his works for a time can be unequivocally denied.

The India Air Service

FROM January to October 200,000 miles were flown by Imperial Airways machines on the route from England to India. On only four occasions were the mails delivered late at Karachi.

RESERVE OF AIR FORCE OFFICERS.

General Duties Branch

Pilot Officer on probation G. J. W. Oddie is confirmed in rank (Oct. 1); Flying Officer on probation F. W. Hartridge, of the Special Reserve, is confirmed in rank (June 29). The follg. are transferred from Class A to Class C:—Flight Lt. A. J. R. Moss (Aug. 9); Flying Officer F. H. Hannaford (Oct. 14); Flying Officer L. F. Hooper is transferred from Class AA (ii) to Class C (Oct. 3).

Flight Lt. R. A. Vosper relinquishes his commn. on completion of service and is permitted to retain his rank (Sept. 12); Flying Officer K. R. Warton relinquishes his commn. on appointment to short-service commn. in R.A.F. (Oct. 28).

Accountant Branch

Flying Officer F. L. Wood relinquishes his commn. on completion of service (Sept. 5).

AUXILIARY AIR FORCE.

General Duties Branch

No. 601 (COUNTY OF LONDON) (BOMBER) SQUADRON. The Rt. Hon. Sir S. J. G. Hoare, Bt., G.B.E., C.M.G., D.L., J.P., M.P., to be Honorary Air Commodore (Nov. 11). No. 604 (COUNTY OF MIDDLESEX) (BOMBER) SQUADRON. The follg. to be Pilot Officer:—C. D. Griffiths (Sept. 29).

Uxbridge, 3.11.30. R. L. R. Atcherley, to No. 14 Sqdn., Amman, 13.10.30. G. T. H. Pack, to Sch. of Techn. Training (Men), Manston, 12.11.30.

Stores Branch

Flight-Lieutenants: W. B. Frederick, to No. 1 Air Defence Group H.Q. 30.10.30. E. C. Farman, to Station H.Q., Donibristle, 3.11.30. R. T. Rich, to Sch. of Photography, S. Farnborough, 16.11.30. A. H. Comfort, to R.A.F. Depot, Uxbridge, 7.10.30.

Flying Officer F. R. Lines, to R.A.F. Record Office, Ruislip, 1.11.30.

NAVAL APPOINTMENT

The following appointment was made by the Admiralty on Nov. 8:—Lieut.-Comdr. Flt. Lieut., R.F.A.—T. O. Bulteel, to *Victory*, of B.T.S., Gosport (Nov. 17).

PUBLICATIONS RECEIVED

The Final Report of the Daniel Guggenheim Fund for the Promotion of Aeronautics, 1929.

City Noise. Edited by E. F. Brown, E. B. Dennis, Jr., J. Henry and G. E. Pendray. Noise Abatement Commission. Department of Health, New York City, U.S.A.

NEW COMPANY REGISTERED

HUDSON FOLDING BOAT & ENGINEERING CO., LTD.—Capital, £1,000 in 180 ordinary shares of £5 each, and 2,000 founders' shares of 1s. each. Acquired from R. J. H. Hudson, the benefit of certain inventions relating to the design of collapsible boats, foldings seats, collapsible hulls for light boats and floats for aircraft and the like, and the benefit of a certain invention relating to plywood sheets. Permanent directors:—R. J. H. Hudson, 89, Pembroke Road, Dublin, engineer and naval architect (chairman). G. H. Porter, 8, The Park, Sidcup, Kent, civil servant.

AERONAUTICAL PATENT SPECIFICATIONS

(Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motors. The numbers in brackets are those under which the Specification will be printed and abridged, etc.)

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